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IN THIS ISSUE

The reader's attention is especially called to the articles written by Frank C. Moore, R. A. Hinderman, V. L. Pickens, Arnold W. Reitze, and Hugh J. Betts, which appear in this issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. These men have written, not from the narrow viewpoint of one shop activity, but from the broad angle of the whole field of industrial-arts work. This material will, therefore, be of great value to every shop instructor.

Those interested in tests may get inspiration or direct use out of the four submitted by O. E. Monninger, Herbert K. Iverson, Jerome Isrow, and Fred W. Weyer.

There are two articles, one by R. Randolph Karch, the other by May Lillian Lampe, that contain much of special interest for those engaged in the teaching of printing.

For the instructor of drafting, there are the articles by August Flam and William W. Little.

Then, there are eight articles for classes in woodworking and five for the classes in metalworking.

Besides these, there are several others of interest to instructors of related subjects, arts and crafts, and out-of-school activities.

This issue also contains the conclusion of Dr. Joseph W. Fleming's study on "Predicting Trade-School Success."

CONVENTIONS TO BE HELD

March 23–25	Texas Vocational Teachers Association, Houston, Tex.
March 31–April 1	Indiana Industrial Education Association, South Bend, Ind.
April 13–15	Illinois Vocational Association, Moline, Ill.
April 14–15	Annual Drawing Conference, Ames, Iowa
April 21–22	Nebraska Industrial-Arts Teachers Association, Omaha, Nebr.
April 27–29	Michigan Industrial Education Association, Grand Rapids, Mich.
May 3–6	Western Arts Association, Grand Rapids, Mich.
May 5–6	Wisconsin Vocational Association for Adult Education, Oshkosh, Wis.

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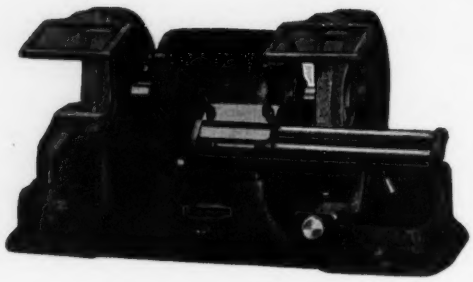
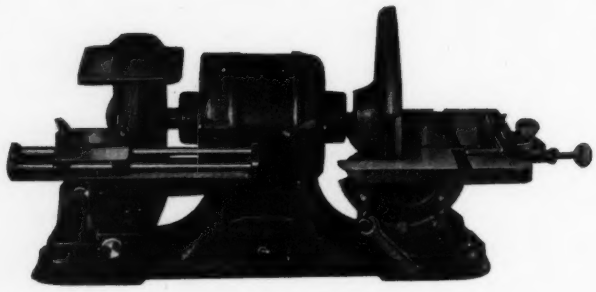
The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago; Phillippine Education Co., Manila, P. I.

W-80 GRINDER



W-80 Double Grinder, bench type



W-80 Grinder, W-95 Disc Sander—Also available on floor type base

A valuable accessory is the bit and knife grinding attachment shown in position in the illustrations above. It eliminates the necessity for experience in tool grinding. Can be set at any angle from 15° to 90°. Will take knives from a 6″ jointer and plane bits up to 2½″ wide. Available as extra equipment. The W-80 Grinder is also offered in single direct motor driven and single belt driven bench models and as a double floor type machine. It can be mounted with the W-95 Disc Sander or the W-90 Belt Sander. Further information will gladly be sent at your request.

YATES-AMERICAN MACHINE COMPANY • BELOIT, WISCONSIN

This is the sixth of a series of brief articles dealing with various woods, their properties and uses. It is our hope that they might make interesting and helpful classroom material. We will welcome your suggestions as to the species of wood you would like featured in this series.

YATES-AMERICAN

A good grinder need not necessarily be expensive—the Yates-American W-80 Grinder conclusively proves this fact. Safe and sturdy . . . exceptional in quality . . . it represents a truly outstanding value . . . worthy of consideration by all school shop men.

It is built to withstand the heavy shock loads of grinding and will give satisfactory service continuously, day in and day out. The cast-iron frame, for instance, is unusually heavy and strong . . . weight is well distributed to provide a substantial mounting for the motor and wheels, and to minimize vibration.

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SHORT TALKS ON WOOD

RED SPRUCE (*Picea rubra*)

The growing scarcity of white pine makes red spruce one of our most valuable trees for the production of lumber. It is strong, light, elastic and straight-grained. Color is dull white. Easy to plane and saw, but hard to chisel across the grain. Nails fairly well. Shrinks and warps but little.

Red spruce is used chiefly for joists, sills, scantlings and heavy construction timbers. Its strength, elasticity and resonance admirably fit it to the manufacture of musical instruments. Strong, light furniture can be made of it. Also one of the principal woods used for paper pulp.

Occurs from Newfoundland west to Minnesota, south to New Jersey and Pennsylvania and along the Alleghenies to Georgia. Prefers the well-drained but moist, rocky soils of uplands or mountain slopes. Slow growing.

A medium sized tree, commonly reaching a height of 40 to 50 feet and a diameter of 1 to 2 feet. Narrowly conical in outline. Trunk is straight and tapers gradually. The branches are somewhat drooping, clothe the stem nearly to the ground, and are persistent even in dense stands.

The bark is thin, close-fitting, and peels off into small reddish brown scales. The leaves are linear, four-sided, about ½″ long, sharp-pointed, dark yellow-green and glossy. Grow from all sides of the twig. Cones are oblong, 1 to 2 inches long with thin reddish-brown scales. They fall soon after the seeds are scattered.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

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Trends in Industrial-Arts Education

Frank C. Moore

Director Industrial Arts, Cleveland, Ohio

A forecast and suggestions for the improvement of industrial arts in elementary and secondary education. Delivered before the Wisconsin Industrial Arts Association, Milwaukee, Wis., the Connecticut State Teachers Association, Hartford, Conn., and the American Vocational Association, St. Louis, Mo.

In order to forecast from a common basis, we must have in our minds a definition of industrial arts which is interpretable and understandable to all concerned. The "Ohio Prospectus" which was got out by the Ohio State Committee contains a very comprehensive definition which will be used as a basis from which to forecast all industrial-arts work throughout this article. This definition reads as follows: "Industrial arts is one of the practical arts, a form of general, or non-vocational education, which provides learners with experiences, understandings, and appreciations of materials, tools, processes, products, and of the vocational conditions and requirements incident generally to the manufacturing and mechanical industries.

"These results are achieved through design and construction of useful products in laboratories or shops, appropriately staffed and equipped, supplemented by readings, investigations, discussions, films, visits, reports, and similar activities characteristic of youthful interests and aptitudes in things industrial.

"The subject of industrial arts, while encompassing all age and school levels, is justified in secondary-school areas for such purposes as exploration, guidance, the development of avocational and vocational interests and aptitudes, specific manual abilities, desirable personal-social traits growing out of industrial experiences, ability to choose and use industrial products wisely — all coupled with the aesthetic relationships involved. In general, its purposes are educationally social rather than vocationally economic, although in the senior high school it may increasingly emphasize vocational objectives in a non-legal sense, for certain students."

As may be readily seen, *industrial arts* as it is defined by the "Ohio Prospectus" is an entirely different thing than the old *manual training* which I was fortunate enough to take when in school. Manual training of the old form was considered a 7th- and 8th-grade course in woodwork, often followed by a 9th-, 10th-, and 11th-grade course in the same subject.

Elementary Schools

Within the next ten years we, in the field of industrial arts, will develop the greatest elementary industrial-arts program this country has ever seen — or some other field will take up this development and do a type of work which we should be doing. Elementary industrial arts is at the threshold of the greatest development it has ever had, but we must be ready to interpret it.

Let me give you the psychological facts underlying this new development. If we are to believe what is constantly told us — that learning takes place best where there is interest on the part of the learner — then we must realize that for the elementary child the printed page has never filled the bill psychologically. No child has ever been continually interested in the printed page and what it offers. There has always been some means of trying to motivate this page by pictures and various other devices. If we, in the field of industrial arts, will develop the right curriculum, covering the right subjects, we can make this period in the child's educational development the most interesting and purposeful of all periods which are to follow.

Outside the psychological facts entering into the elementary program, sociologically we are faced with an emotional malnutrition in the elementary grades that is going to be with us for a long time. If you and I, who are older, are to think of the homes since 1929 and the home in which we grew up, we can readily see that the emotional life of a child today is far different from that which we enjoyed.

The child whose parents are out of work half the time — whose parents are on some form of relief, or who are temporarily employed through some project, whatever its nature — must be experiencing a very false home life. A home life without hope, without aspirations, without the money to make possible the right kind of play for the child, is going to leave its impression on the child. And for that child to come to school and be tied down to the printed page — we cannot expect much interest or enthusiasm.

We must substitute for this formal education a type of purposeful activity which allows emotional outlet, a physical expression, a mental development, an outlet for the powers of imagination, and the satisfaction which comes from a completed job. We must have all these things play a part in the educational system, and if we install in our elementary grades the right kind of elementary handcraft program, then, and then only, are we doing for the child of the lower grade that which we can do and should do under the present economic setup.

This craftroom of the future will have in it ceramics, novelty metal, linoleum-block printing, woodwork, textiles, and maybe one or two other areas. Boys and girls will both come at the same time. The room will be divided into cottages or areas. The teaching will be done by women trained in a teacher-training institution for this purpose.

The curriculum will be closely correlated at every grade level with the so-called "academic subjects." The projects will be individual, group, and unit projects. We, in this field of industrial arts, will either accept this responsibility and take over a major part of the elementary curriculum, or stand aside and see it taken over by those not nearly so well fitted to do the job as we should be.

Junior or Senior High

In trying to forecast trends in the junior or senior high school, it seems to be almost

impossible to separate these two fields. I will speak of them as trends in the field of industrial arts in secondary schools, and at times will emphasize that which I think belongs at the lower level of the secondary school and that which belongs at the upper level or senior high school.

Due to the change in enrollment and the fact that more people are going to have to be accommodated in our secondary schools, it seems to me that we must look at this field in terms of what areas should be added and how the work in the areas which we already have must be changed to meet the new social economic conditions.

Woodwork

There must be a reorganization of woodwork in terms of general woodworking. We cannot continue to have the field all cabinetwork. There must be some patternwork of the simplest kind in order for people to understand that phase of industry and industrial methods. There should be a little building construction from the standpoint of consumer values and as a basis for further technical training. There should be a definite course in finishing, since that is going to be a necessity on furniture in the future. There should be some emphasis on wood carving for its various decorative and hobby possibilities.

General Metal

In our general metal, we must be sure that we emphasize all the phases of metalwork which the boy should know today. We must have in our general metal shop: Bench metal, foundry, forge, sheet metal, simple machine-shop practice, simple heat treating, welding, spinning, and novelty metal. All these phases of metalwork are part of the secondary industrial-arts field and must be included in the metal curriculum if the boy is going to have the right background for future industrial interpretation.

Novelty metal is one which I don't think we have emphasized enough. It has great craft possibilities, and is useful especially for girls. I believe we must reorganize so that this is part of our curriculum. The same emphasis that I made on projects under woodwork are applicable to metal as well.

Drawing

In drawing there are very specific trends. The work will progress rapidly toward general instead of mechanical drawing. Now, when I say *instead* I don't mean mechanical drawing will be left out of the general drawing curriculum, but I do believe that the various forms of pictorial drawing — perspective, isometric, and cabinet — will form a large part of our drawing curriculum. These pictorial methods will be conducted both freehand and straightedge. There will be a distinct trend toward some form of simple blueprint reading from the standpoint of interpretation.

Inking will be gradually eliminated from the lower secondary-school period. It will be carried on only for those expecting to specialize in some form of drawing.

Drawing will find more use of textbooks than any other industrial-arts subject. There are only two reasons for teaching drawing in the secondary period of the child's school development; one is that he be able to interpret the ideas of others through the medium of some kind of drawing; the other is that he be able to interpret to others his own ideas through the medium of a drawing.

If we keep these two major objectives of drawing constantly in mind, the trends about which I have spoken will naturally be the result. Remember, interpretation is the key and reason for drawing, and that manipulation, although an important factor, is a means rather than an end toward this interpretative goal.

Printing

There will be great changes in printing if it is going to remain an educational subject, as I think it should. Less time will be devoted to actual composition and presswork. This will always be an integral part of the printing setup, but it will not mean that 95 per cent of the time should be devoted to these types of work. There will be distinct emphasis on design and layout in the printing work.

Artistic printing must be a goal of the printing department because artistic printing has the greatest consumer value of anything in the whole printing work. And I might say that all this printing should be interpreted as a graphic-arts course.

There will be a trend toward bookbinding becoming an integral part of the printing course. This can be easily done in the printshop and adds to the value of the work.

There will be in many shops simple papermaking devices to show just how paper is made, the kinds of paper made, and to give the boy informational value and consumer value out of knowing about the manufacture of paper.

There will be more shop visits to printing establishments in order that boys may see the new trends in the industry. Printing has changed more in the past twenty years than any other type of industrial work, and I think it is up to the printing teachers to see that the boys know what new trends and developments in the field are, so that they may become acquainted not only with consumer values but job possibilities in this type of work.

As to the problems or exercises to be done in the printshop, I believe there will be a distinct trend toward less production work and more education. If this is not a trend, then we are wronging our printing teachers and pupils taking the subject.

There will be more emphasis on boy problems in connection with the printing which boys do. It will have to do with their own clubs, with games, with athletic contests, current topics, signed articles and other things boys will be proud to print, and which will have value in terms of techniques involved as well as content expressed.

I see great possibilities in the graphic-arts field, but see the necessity for complete reorganization of the old-time printshop into the new graphic-arts laboratories.

Electricity

I rather hesitate to approach this subject of electricity because I have seen it in so many different ways in industrial-arts shops throughout the country. I think the trend will be toward general electricity but not bell wiring and splicing as exercises. I believe that bell wiring and splicing go back toward the old-time manual training instead of ahead toward the new industrial arts.

I think the emphasis will be on the making of projects — boy projects, interesting projects, problems requiring that the fundamentals of electricity be used in correlation with wood and metal, so that when the boy has finished a given project, it fills a need for him.

In electricity, as in many other fields, we have chosen projects from the adult standpoint rather than the boy himself. We must remember that boys are interested in shocking machines, in crystal sets, in motors if they actually run something — but not in motors themselves. We must realize that in this field, as in all other fields, boy interest, boy aptitudes, and boy abilities are the controlling factors when it comes to the selection of projects to be covered.

Auto Mechanics

In the field of auto mechanics, I am not very sure of the trend. I think that where auto mechanics is taught, the emphasis will be on ignition, general maintenance, fender work, repairing, touching up, and servicing.

Very little time in the future, as I see it, will be spent on the old-time long-unit auto-mechanics project. We must realize that in the field of auto mechanics, adjustment and repair will be a part of the work, but replacement will be the big factor. Most companies are making it cheaper now to replace worn units rather than go through the longer and expensive repair unit involved. It is not necessary for me to suggest just what these long units are.

Plastics

I believe there must be some emphasis on the field of plastics. Plastics have come into our world today. They are a wonderful medium to be used in industrial arts. They have great craft possibilities, both for boys and girls. At the present time, they are a little too expensive to be used extensively. I think the time will come when they will be much cheaper and can be made in molds by our own shop people, which will make them less expensive at once. This material has great possibilities for design, for finish, for artistic construction, and for useful projects. Projects of boy and girl interest may be constructed of this material very satisfactorily.

Trends in Methods

As I see the trend in methods in industrial arts, there are four or five major points which we must take into consideration.

There is first of all, the use of instruction material. I believe the time has come in our field when we must make better use of the instructional material available rather than spend so much time on getting out written instructional material of our own. It seems to me one of the greatest wastes of the past few years has been the writing and rewriting of instruction sheets for various kinds of activities when better sheets were already available.

Textbooks will become an integral part of industrial-arts work and should be selected with great care and should be used in the best possible manner. But they are here and I say once again, should be used rather than redeveloped by people without time and without experience.

There will be a trend to have more short lectures of informational value to pupils in the various courses — these lectures to be an accumulation of material which boys and girls at this age should know and in which they should be interested. This lecture will, in many cases, be followed by passing out of interesting data to be used as part of the notebooks for various activities. Notebooks should be for the purpose of assembling this material, rather than copying any lectures given or any material placed on the board.

Visual aids, as you all know, have become an integral part of industrial-arts instructional material. I think we should soon get together on what visual aids are necessary in our individual shops. Graphs, charts, slides and movies, and magazines, are all available to all of us and in many, many instances free of charge. They should be used, and wisely used, as an educational method of instruction.

Shop trips will become more a part of instructional material to be used, but a shop trip is of no value, unless it is a trip for a purpose, with a purpose, and with an outline, so that the student has definite things to look for and definite things to find out. Otherwise, this trip becomes merely a matter of amusement with little information and little value.

There will be a trend to better plans for teaching industrial-arts work. I think we can take a page from the academic teachers and be sure that our material is organized so that we know what we are teaching and why we are teaching, and how we are going to do the job. Good teaching is the result of planning, not the result of unorganized activity.

Methods of Organization

The second main head under trends in methods is organization. With larger classes and more areas to be covered in a given shop, organization becomes a paramount issue for every teacher. He must set up some sort of functional organization that makes it possible for him to be a teacher rather than just a checker. Shop teaching takes place when the demonstration ceases and there must be time for the teacher to do this teaching job outside of routine duties.

My suggestion is that there will be a trend toward better pupil personnel, more foremen: foremen only selected from classes who have previously had the work and students who understand the technique; foremen to be selected and trained by a foremen-training teacher. Credit to be given in foremanship the same as any other industrial-arts activities. Discussions to be held during the foreman course and discussions to be held after the pupil is actually a foreman, so that they know what the foreman's job is, how it should be done, and how they are doing their job. This, I think, can be an important phase in method.

Means of Evaluation

The third trend in method will be toward better means of evaluation. I am not sure that in all my experience I have yet seen the right way to evaluate industrial-arts pupil progress. I think there must be a trend toward better methods of evaluation, either through progress charts, methods of grading, testing, or some combination of these three vital factors, if we are going to have industrial-arts progress mean anything to either the teacher or the student.

Attitudes and Habits

Fourth, under trends in methods, is attitudes and habits. I believe that attitudes and habits are the result of method and not the result of content. Attitudes and habits are ideas. They are very hard to evaluate but they are the result of doing and thinking along certain lines.

We in the field of industrial arts have the greatest opportunity to develop right attitudes toward work and right habits of work with and for people, better than any other subject in the whole curriculum, but these attitudes and habits will be the result of organization and method and not the result of just industrial-arts work. Let us spend more time with these two ideas uppermost in our minds so that we know pupils are learning how to work with and for people and developing the right attitude toward work through our shops.

Bibliographies and Libraries

There will be a distinct trend toward better bibliographies and better libraries in our school shops. I have brought along a mimeographed copy of what is included in our library downtown. These books are available to teachers in our field to see and, within limits, are available for them to buy as part of the industrial-arts library. Much valuable material is in our field. We should read it, know what it is, and make use of it.

Trends in Projects

There will be a distinct trend in projects, first, toward better design. We must have correlation of beauty and art in our industrial-arts projects. They must be simpler in design. They must be more beautiful, must be well balanced, properly proportioned, and properly finished.

There will be a distinct trend toward more modern, but not modernistic furniture. This new modern furniture will be plain, well designed, and above all, have utilitarian value. If you will notice, good modern furniture is the most utilitarian of any furniture we have ever had. Under this modern furniture it will be necessary for us to make a good selection of material to be used. Most of it is finished natural, and if that be the case, choice of material is an important factor. Also under this modern furniture you know that good and artistic finish is emphasized. Therefore, we must be sure that our projects are properly finished to fit in with the modern trend as we see it.

Smaller Projects

Second, under trends in projects will be smaller projects. It seems to me we have been very unwise in our choice of projects. We have chosen things to make with a reason why they should be made. I think in many cases it is possible to make much smaller projects requiring more fundamentals, requiring as great skill to make, using less material, and being within the ability of a child to buy. Smaller projects will require less equipment and not nearly so much storage space in our shops.

I believe that we can, if we keep this in mind, reduce the size of our projects to within the limits of a child to buy, and yet have projects more utilitarian, more valuable, more interesting, and more educational than those we have had before.

Boy Interest

The third trend under projects is toward boy interest. This is a phobia with me. It seems to me we must choose things which boys want to make and I believe that we can choose these and still follow any sequence of difficulty which we may have set up in terms of fundamentals to be covered in a given grade's work.

His interest may not be furniture — it may be toys, puzzles, boats, airplanes, sleds, scooters, wagons, or something with hobby possibilities which we may not have thought of at all.

In drawing, it seems to me we should not have anything that hasn't a definite appeal to the boy. I'll admit this appeal may have to be sold at times, but when I see a boy in drawing working on a problem entitled "A Hollow Tile," I wonder what his interests are, why he thinks he should draw it, or whether he cares whether he does or not. When I look at the various machine drawings of cams, etc., having to do with large machines, I wonder what is wrong with the bicycle in terms of drawing. In all our fields, I think we will have to find more interesting projects for boys.

Then something must be done with boy

projects in terms of hobbies. I don't believe we have thought enough about hobbies in connection with industrial-arts work. In the first place, hobbies are the result of some interest developed either in or out of school, plus some ability to be able to follow this interest with a fair degree of success. Very few people continue hobbies in which they are not getting some degree of satisfaction and fairly good results.

I believe that if we start these boys in on hobbies in the secondary-school period, we will help to bridge the gap between the end of school and the entrance to employment, and I believe we will give them an interest to carry all through life. Much of the work in the future will not be for personal satisfaction, but in order to make a living so that the individual may have time to indulge in something for his own personal satisfactions.

Hobbies are those things which one can't wait to do. They are things with which one is occupied during moments of leisure. Therefore, the hobby is an interest, and you must make it part of your thinking in terms of industrial arts.

Trends in Administration

Practically every one of us knows and feels that there is more interest shown toward our work. This seems to be true nationally. It is the result of a social-economic upheaval. It is an educational trend as a result of this upheaval. It is not a trend which we can directly attribute to ourselves and our fine work.

Now that the trend is here, and now that we see in the next twenty years a trend for administrators to want more of this type of work, I believe that we will have to do more and more about seeing that the work fits in with ideas which administrators already have. Administrators are going to be more conscious of what we are doing since they are interested. They will want to know why, they will watch our work closer in terms of results, but all this should give us an opportunity to really do some good. If we are doing our work as well as we know how, we will be glad to have all this close inspection and it will mean the promotion of our work even further than it is today.

There is a trend toward the making of better displays. When administrators become more interested in our work, they will become more anxious to show it. These exhibits should display actual pupils' work. They should be changed artistically, kept in good condition, and they should portray the full educational value and possibilities of our work.

Industrial Arts and Industrial Society

R. A. Hinderman

Director Special School Services,
Denver Public Schools,
Denver, Colorado

Industrial arts and industrial society are blood relations and should be informed about each other's problems and concerned with each other's progress. And they are, where industrial-arts teachers extend the boundaries of their instruction beyond the classroom and out into the community. The activities and subject matter of industrial arts naturally include the applications of science and the intellectual and muscular efforts of men that make America the world's leading industrial civilization. The industrial-arts teacher has the opportunity to assist his pupils in gaining information not touched upon by other school subjects. Such an understanding of industrial society is really needed by every boy who would succeed against the odds that face him in life.

Vitalizing the Industrial Arts

This great challenge to vitalize learning and extend pupil horizons seems to stand out in bold relief, and yet many industrial-arts teachers seem to have failed to become inspired by it. Perhaps the situation is no different from that of engineering, where we know that all engineers will never become great engineers. But in the field of teaching the problem is one of human engineering, and need for success in helping youth is one of society's most pressing problems. The engineer is given a concept of his profession that teachers could well consider. It is, that great engineering achievements are accomplished only after a lifetime of service, preparation, and continuous growth. No one expects a man who has just received his diploma in civil engineering to design an *Oakland Bay Bridge* or a *Big Thompson Irrigation Project*. Nor does the graduate engineer himself expect such accomplishments, but rather he expects to be a draftsman in an engineering office where, as time goes on, he can learn from a great master.

Such a concept of continuous growth is needed by the teacher or human engineer if he is to succeed and if boys are to learn what they very much need to know. Experience seems to have shown that if teachers are to become masters, they must be carefully selected, broadly educated, thoroughly inspired, and their efforts must meet with a degree of success that is perceptible to them.

Many obstacles are to be found in successfully extending the industrial-arts curriculum beyond the walls of the classroom. This situation, of course, is no unusual phenomenon, because there are problems in every career with a distant and a worthwhile goal. The beginning teacher finds so many problems of class organization and management to be solved that the very nature of the work tends toward limitation rather than expansion. Too frequently, when, after four or five years of service, the teacher has his work fairly well in hand, the tendencies are great that he will continue the routine that is going well and rest back upon his oars.

Making Outside Contacts

Here is the opportunity for leadership from the principal, the director, and not in the least from the teacher's major professor to present in vivid and interesting ways the great problems that lie ahead and are still unsolved. Having received the needed encouragement and having pondered it a while, the teacher may go with one of his pupils to visit a metal-products plant owned by the pupil's father.

Student growth and teacher growth are the natural outcomes of well-planned industrial-arts courses which extend beyond the confines of the classroom.

The experience is exceedingly interesting and indeed gratifying. The boy's father is very much pleased to become acquainted with the teacher and being justly proud of his plant, proceeds to tell about his products, processes, problems, and achievements.

To cite a specific case is merely to continue this story. In a Midwestern City an industrial-arts teacher had visited a plant and had for several days been thinking about the many new ideas and activities about which he had learned. Also he found occasions where this information fitted into a number of class discussions on metalwork and that pupils seemed to manifest a real interest in this type of industrial information.

One day the boy invited his teacher to dinner and it was with keen interest that personal preparations were made for this visit to the boy's home. After dinner the men went to the study and much to the instructor's delight he found that industrialists are interested in what the school is trying to do for boys. This opportunity made it possible to describe the work of the school and tentative plans for extending the pupils' horizons beyond what could be learned in the classroom.

The industrialist was much pleased with the idea of enrichment and said he had a plan that would make other plants avail-

able for visits and study. Several days later the principal called the teacher to the office and told him that Mr. Brown needed another worker in his industrial division for the community-chest campaign and that he had been selected to participate. For two weeks this teacher met at noon luncheons with the industrial group and became very well acquainted with them. He also called on fifteen industrial plants and helped organize their drivers for subscriptions. Out of this wonderful experience came two things of great value. First, of course, were the new acquaintances which facilitated the extension of the industrial-arts program to the community; and second, and of probably more significance, was the opportunity to serve under the inspiring leadership of a great industrialist and to work shoulder to shoulder with other industrialists.

On several occasions this teacher has remarked that the intelligent and sympathetic leadership he received, and the urge that he felt to go forward and accomplish things were without doubt among his most priceless experiences. This example has been cited to indicate a type of motivation that teachers need and one that creates a desire for more like it. This type of experience results in good teaching, and a concern for greater accomplishment and growth.

Industrial Arts and Society

Having considered at some length the teacher's role in this problem of industrial arts and industrial society, it would seem valuable to look at the problem itself. Economic conditions over which we have little control have wrought some far-reaching changes in our educational system during the past decade. Some time back the junior-high-school movement was launched as a means of helping more youth by keeping them in school until a later age when they would be fitted better for participation in life. The problem then, was one of keeping pupils in school longer in order to help them do more for themselves.

The present situation has about reversed itself. In many communities as high as 95 per cent of the pupils of high-school age continue in school until graduation. This condition has come about because there is little else for youth to do. Therefore, the problem now is one of providing for the needs of all of the children of all of the people rather than for a selected group.

It is interesting to note that the elementary-school child who lives in a rather small community is very well acquainted with all aspects pertaining to his surroundings. If one wishes to know what business establishments there are in the vicinity, Johnny knows, or if father wants to know who lives on the next corner, Johnny knows. But, when Johnny goes to junior high school, his community becomes larger and his schoolwork more confining and his understanding of the community less and less specific. Until in senior high school with its many demands upon him and his inability to participate in earning activities because of present economic conditions, Johnny becomes almost perfectly insulated from the community. His situation becomes very much like that of the apartment dweller who knows with considerable detail what his neighbor has to eat, but does not know his neighbor.

A further reason for relating industrial arts and industrial society is the fact that while economic conditions have changed, the biological aspects of growth and development have not changed. Boys and girls now seem to have the same normal impulses they have always had. They fall in love, seek homes, desire families, and want to earn a living in the manner of all normal people. Therefore, the first wage-earning adjustment that a person makes at the age of from nineteen to twenty-two is a very serious affair. He finds it difficult to make the many adjustments from job to job and at the same time assume responsibilities that go with being the head of a family. With the rapidity of technological change, the increasing complexity of society, and the keen competition for work, our job as teachers seems to be one of making youth's knowledge of the community more specific.

Industrial Arts and the Community

The problem of relating the school and the community includes helping pupils to understand the community, assisting pupils to develop skill in participating in the community, and aiding individuals in working out plans of occupational adjustment that are possible of accomplishment. It is not the purpose here to overlook the needs youth have for knowing about the cultural, civic, recreational, and educational aspects of community life, but it is important to note that all of these aspects presuppose that a person can earn a living wage, and a little more. Therefore, since industrial-arts courses are naturally related to industrial society the occupational adjustment aspect of school and community relationships is being given specific emphasis.

There are many ways in which the industrial-arts curriculum can and should be extended beyond the walls of the classroom, and three examples will be described. The utilization of community resources is facilitated by means of visual aids and particularly by the sound motion picture. With its assistance many aspects of industrial life foreign to a given community can be brought into the classroom.

One group of boys became deeply interested in the great engineering project known as the Oakland Bay Bridge. With the assistance of the local representative of the United States Steel Corporation a great amount of varied and pertinent information was assembled. On further search it was found that the school children of San Francisco had studied bridges from all points of view, and had compiled references on bridges in the fields of mathematics, literature, history, poetry, and the Bible. Following this groundwork the crowning achievement came when the film on the construction of the Oakland Bay Bridge was shown to the class. This pictured to the boys how the caissons were constructed and placed many feet below the surface of the water, how the cables were spun as they were carried from shore to shore, how the weblike bracing was attached to the cables, and finally how the decks were secured. It interested them also, when they were told how many lives were sacrificed in building the bridge, how the bridge moves fourteen feet toward the side which faces the sun, and how the salt air makes it necessary for painters to begin applying a fresh coat of paint to the bridge as soon as they have finished putting one protecting coat.

And now the United States Steel Corporation has completed in technicolor another significant educational film entitled "Steel — Man's Servant." These films and many others are valuable in themselves, but when their use is planned and the many worth-while contracts with industrial representatives are made, the activities help boys relate industrial-arts to industrial society.

Shop Trips

A second means of utilizing community resources is the excursion to an industrial plant. Here the good industrial-arts teacher keeps abreast of the time, maintains valuable acquaintances with industrial leaders, and helps boys to acquire basic understandings of industrial processes. The teacher and the class usually plan the excursions for the semester and a committee on arrangements and one on transportation are chosen for each excursion. The committee on arrangements, secures permission to visit, get someone at the plant to conduct the tour and answer questions, and prepares a mimeographed form on points of observation. This committee also has charge of evaluation which includes the compiling of a test made from questions submitted by classmates and a report of what the industrial representative thought of the class; its preparation and procedure, and his suggestions for future visits. The committee on transportation gets cars and not the least important of their duties is inviting as many parents as care to go on the excursion to take advantage of the opportunity. It may be of interest to note that parents become enthusiastic about these visits and participate in them in the prescribed manner. As did one such group of parents who accompanied a class on an excursion to a plant that manufactured surgical equipment. There they observed the application of lifelike mahogany and walnut finishes to steel, the double and triple chromium plating of handles and accessories, and the illuminating devices that prevent shadows over an operating table. The outcomes of excursions like this one are worth while and varied, and can be made even more valuable through the continued efforts of

the teacher and the co-operation of the community.

It is frequently pointed out that the unique and valuable feature of industrial-arts instruction is that the activities involve the manipulation of tools and materials. A good industrial-arts teacher recently described two shop activities that appear to have many educational possibilities in them.

The first activity he described was that of planning a city block of new houses. The class, at different times, became a city planning board, a firm of architects, and a general construction company. The class in its imagination razed a block of old dilapidated residences, salvaged good materials, and disposed of junk. The planning was very interesting and included much reference reading, viewing of house plans, and interviewing of parents, teachers, and architects.

There were several outstanding features in the plans that were drawn by the pupils. The houses were located next to the street and the big courtlike interior of the block was laid out to provide space for the games of the children for the comfort of the adults. The plans that the boys made for the houses used much glass and brought in the out of doors. Partitions were minimized, and warmth and coloring effects were provided. A swimming pool was planned on the roof of one of the larger houses when the boys found that the manager of a Penney Store had placed a five-foot tank of water over the entire store roof for purpose of air conditioning, during the summer months. The city planning project required much investigation, the making of plans and elevations, and the construction of a model which now is the pride of the class and of the school.

Another project described by this teacher was along a similar line where the class planned an apartment building that insured the maximum in privacy, comfort, and economy. Sunlighting, artificial lighting, storage, garages, and stores were studied very carefully. The problem of providing for stores on the first floor was an interesting consideration. What types were needed, how many, what was a just rental, and so on, were all questions that were investigated. Plans were drawn and again a model was constructed and a real sense of achievement seemed to result from these activities.

The foregoing ideas and suggestions have been presented to show the need for utilizing community resources in vitalizing instruction; to describe intriguing activities that result in teacher growth; and to point out the student values that grow out of the natural relationship of industrial arts and industrial society.

Predicting Trade-School Success—VI

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This is the conclusion of this study covering the relation of achievement in the vocational high school and success in employment.

This part of the study is not to be considered as an employment survey to determine the number of vocational-high-school boys employed at their own or related trades, nor of the employment opportunities open for such boys. It is an attempt to determine what relationship exists between shop teachers' marks and term of stay in the vocational high school, and certain employment records. The employment records include level of employment earnings, and employers' ratings.

The relation between shop teachers' marks and employers' ratings, or evaluation of the boys' knowledge and skills, needs to be known. If it is found that both the employers' and the shop teachers' evaluation of the boy's knowledge and skills are in agreement, it helps to establish confidence in shop teachers' marks. To obtain this relationship, it was found desirable to recognize two groups of boys because of differences in the amount of training received, the quality of work done in the vocational high school, and the aid given to the boy in finding employment.

Group A includes boys who left school with a minimum of one year of training in the vocational-high-school shop and who attempted to find their own jobs. They have varying amounts of training and have shop teachers' marks ranging from high to low.

Group B includes those boys with two or more years of training in the vocational high school, with a rating of average or better in shopwork. These boys are called "co-operative apprentices." The co-ordinator in charge of employment tries to match the requirements of the job with the training and ability of these boys from the vocational high school.

According to available records, these boys are employed at the occupation for which they were trained in the C. B. Connelley Vocational High School.

Boys Who Found Their Own Jobs

The data collected for this part of the chapter are in response to an employment questionnaire postal card mailed to 1,580 boys who had had one or more years of training in the trade-school shop during the period of 1931 to 1935. Replies were received from 523 boys, approximately 1 in 3. They represent a sampling of what becomes of the boy after he leaves school. Of the 523 replies, only 366 are used in this study — 157 were omitted because of "failure to answer all questions," "enlisted in army or navy," "returned to school," "unclaimed," or "deceased."

The data on employment are necessarily limited because of the economic conditions of the country during the depression years of 1931 to 1935 when employment with a private concern was difficult to obtain.

The employment data are shown under three headings:

1. Employed at the trade learned in the vocational high school, or work related to this trade — Group 1. This group was limited to boys employed in work that involved knowledges and skills similar to those required in the trade which they had learned in school.

2. Employed at work not related to the trade learned in school — Group 2.

3. Unemployed — Group 3.

The data obtained from this study are shown in the following tables.

Tables XXXIXa to XLIb show the differences between the averages of earnings, number of semesters in the trade school, shop teachers' marks, and success in employment. The comparisons are made between the three groups of boys.

The difference of 16 cents between the average rate per hour of those boys employed at their own or related trade and those employed at nonrelated trade is reliable, as shown by the critical ratio of 12.3. If earning power is used as a basis of measuring success in employment, then boys finding jobs in their own or related trades are more successful than those employed at work differing from that learned in school. It is obvious that boys who work, whether at trades for which they have been trained, or at related trades are more successful than those who are not employed at all.

The differences in the number of semesters spent in training between the three groups are all reliable. On the basis of these findings, boys who stay in school longer have better chances of finding employment in their own or related trades. Boys who stay the shortest period of time in school are less likely to find employment in any sort of work.

These tables show that the difference between the averages of the shop teachers' marks for the group of boys employed at their own or related trade and those employed at work not related to their trade is reliable. The critical ratio is 4.7.

TABLE XXXVIII

AVERAGES OF SHOP TEACHERS' MARKS, NUMBER OF SEMESTERS IN THE TRADE SCHOOL, AND EARNINGS OF THE 366 BOYS WHO REPLIED TO THE EMPLOYMENT QUESTIONNAIRE

	Shop Teachers' Marks—Average	*Average No. of Semesters*	*Average Rate Per Hour*	*Number of Boys*
Employed at own or related trade (Group 1)	2.84	4.95	$.47	109
Employed, but not at own or related trade (Group 2)	2.57	3.84	.31	178
Unemployed (Group 3)	2.45	3.38	.....	79
			Total	366

TABLE XXXIXa

RELIABILITY OF THE MEANS OF THE EARNINGS OF GROUPS 1 AND 2

Classification	*Means*	*Stand. Dev.*	*Probable Error*	*N*
Employed Group 1	$ 47	192	.012	109
Employed Group 2	31	126	.006	178

TABLE XXXIXb

RELIABILITY OF THE DIFFERENCES IN THE MEANS OF THE EARNINGS OF GROUPS 1 AND 2

Obtained Difference of the Means	*P.E. Difference of the Means*	*Critical Ratio*
$ 16	013	12.3

TABLE XLa

RELIABILITY OF THE MEANS OF THE NUMBER OF SEMESTERS IN TRAINING AT THE TRADE SCHOOL BETWEEN THE EMPLOYED AND THE NON-EMPLOYED GROUPS

Classification	*Means*	*Stan. Dev.*	*Probable Error*	*N*
Employed Group 1	4 95	2 15	.139	109
Employed Group 2	3 84	1 93	.097	178
Unemployed Group 3	3 38	1 94	015	79

TABLE XLb

RELIABILITY OF THE DIFFERENCES IN THE MEANS OF NUMBER OF SEMESTERS IN TRAINING

Classification	*Obtained Difference of the Means*	*P.E. Difference of the Means*	*Critical Ratio*
Group 1 and 2	1.11	169	6.5
Group 1 and 3	1.92	.140	13.7
Group 2 and 3	.46	.098	4.7

TABLE XLIa

RELIABILITY OF THE MEANS OF THE SHOP TEACHERS' MARKS BETWEEN THE EMPLOYED AND THE NON-EMPLOYED GROUPS

Classification	*Means*	*Stan. Dev.*	*Probable Error*	*N*
Employed Group 1	2.84	.69	.045	109
Employed Group 2	2.57	.72	.036	178
Unemployed Group 3	2.45	.80	.061	79

TABLE XLIb

RELIABILITY OF THE DIFFERENCES IN THE MEANS OF THE SHOP TEACHERS' MARKS

Classification	*Obtained Difference of the Means*	*P.E. Difference of the Means*	*Critical Ratio*
Group 1 and 2	.27	.057	4.7
Group 1 and 3	39	.075	5.2
Group 2 and 3	12	.070	1 7

TABLE XLII

CHANCES FOR FINDING VARIOUS LEVELS OF EMPLOYMENT OF BOYS WHO HAVE EARNED VARIOUS MARKS IN TRADE SCHOOL SHOP WORK

Employment Status	*A and B* %	N	*C* %	N	*D and E* %	N	*Total*
Own or Related Trade	41.0	76	20.4	29	10.2	4	109
Non-Related Trade	41.6	77	56.4	80	53.9	21	178
Unemployed	17.4	32	23.2	33	35.9	14	79
Total	100%	185	100%	142	100%	39	366

TABLE XLIII

CHANCES FOR FINDING VARIOUS LEVELS OF EMPLOYMENT OF BOYS WHO HAVE SPENT A VARYING NUMBER OF SEMESTERS IN THE TRADE SCHOOL

Employment Status	*2* %	N	*3** %	N	*4* %	N	*5 or over* %	N	*Total*
Own or Related Trade	21.6	8	15.7	19	33.3	35	45.6	47	109
Non-Related Trade	48.6	18	53.7	65	50.4	53	40.8	42	178
Unemployed	29.7	11	30.5	37	16.1	17	13.5	14	79
Total		37		121		105		103	366

*Boys who left the trade school at the end of the third semester did not follow the same general trend as boys who left the trade school at other periods of time. The chances for boys to be employed at their own or related trade increased for each semester up to the end of the eighth semester, excepting the third. Their chances for being unemployed decreased as the number of semesters they spent in school increased, excepting the third semester. There seems to be no apparent explanation for this third semester difference.

The difference between the averages of shop teachers' marks for the boys employed at their own or related trade and the unemployed group is also reliable. The critical ratio is 5.2.

The difference between the averages of shop teachers' marks of those employed at nonrelated work and those unemployed is not reliable. The critical ratio is 1.7.

On the basis of these findings, the boy who makes the highest teachers' mark in shopwork is likely to be employed at his own or a related trade. The boy making lower teachers' marks may not find employment, and the chances are against his finding employment at his own or related trade. These chances for finding employment are shown in the Probability Table XLI.

Table XLII shows the boys' chances in one hundred for finding employment if he has a shop teachers' mark of *A-B, C,* or *D-E*. On the basis of these findings, a boy making *A* or *B* in shopwork has 41 chances in 100 of finding a job in his own or related trade and 17 chances in 100 of not being employed. If he makes a *D* or *E* in shopwork, his chances for finding employment in his own trade drop to 10 in 100, and his chances of not being employed rise to 36 in 100. If he has a shop teachers' mark of *A* or *B*, his chances for finding employment at a nonrelated trade are practically the same as for finding employment in his own or related trade. If he has a mark of *C, D,* or *E,* his chances become less for finding employment at his own or related trade and his chances increase for finding employment at a nonrelated trade.

Table XLIII shows the boy's chances for finding varying levels of employment if he has two, three, four, five, or more semesters of training in the vocational high school. The chances for finding employment at his own or related training increase after the fourth semester. At the end of the second semester, his chances for finding employment at his own trade are 22 in 100 compared with 33 in 100 at the end of the fourth, and 46 in 100 at the end of five or more semesters in training. His chances of being unemployed range from 30 in 100 at the end of the second semester to 13 in 100 at the end of the fifth semester.

The number of semesters in school has little relationship to his finding a job not related to his trade. His chances of being placed in this kind of work are 49 in 100 at the end of the second semester and 41 in 100 at the end of the fifth semester.

The chances are that if employment conditions had been more nearly normal at the time this employment questionnaire postal card was answered (January-February, 1936), more boys would have found jobs in their own line of work. The training of apprentices since 1930 has been practically nil. The data show that even in times of abnormal unemployment, the length of time in trade training is a function of the employment status of the boy after he leaves school.

Boys Placed by the Co-ordinator of the C. B. Connelley Vocational High School (Known as Co-operative Apprentices)

The data for this part of the chapter were obtained in three ways:

TABLE XLIVa

CHANCES FOR OBTAINING VARYING EMPLOYERS' RATINGS OF CO-OPERATIVE APPRENTICES WHO HAVE EARNED A-B-C MARKS IN TRADE SCHOOL SHOP WORK
ATTITUDE TOWARD WORK

Trade School Shop Teachers' Marks

		A		B		C		Total
		%	N	%	N	%	N	
Employers' Ratings	Excellent	37.2	16	30.2	23	25.0	6	45
	Good	53.5	23	56.6	43	66.6	16	82
	Fair	9 3	4	13.2	10	8.4	2	16
	Poor	0 0	0	0.0	0	0.0	0	0
	Summary		43		76		24	143

TABLE XLIVb QUALITY OF WORK

Trade School Shop Teachers' Marks

		A		B		C		Total
		%	N	%	N	%	N	
Employers' Rtings	Excellent	6.9	3	17.1	13	4.2	1	17
	Good	69.8	30	59.2	45	66.6	16	91
	Fair	23.3	10	23.7	18	29.2	7	35
	Poor	0 0	0	0.0	0	0.0	0	0
	Summary		43		76		24	143

TABLE XLIVc RATE OF SPEED

Trade School Shop Teachers' Marks

		A		B		C		Total
		%	N	%	N	%	N	
Employers' Ratings	Excellent	9.3	4	15.7	12	8.3	2	18
	Good	60.4	26	48.8	37	58.4	14	77
	Fair	30.3	13	35.5	27	33.3	8	48
	Poor	0.0	0	0.0	0	0.0	0	0
	Summary		43		76		24	143

TABLE XLV

CHANCES FOR OBTAINING VARYING CO-ORDINATORS' RATINGS OF CO-OPERATIVE APPRENTICES WHO HAVE EARNED A-B-C MARKS IN TRADE SCHOOL SHOP WORK (1933 AND 1934 YEAR GROUP)

Trade School Shop Teachers' Marks

		A		B		C		Total
		%	N	%	N	%	N	
Coordinator's Ratings	EXCELLENT WORKER Above Average in skill and ability	72	8	77	36	58	21	65
	AVERAGE WORKER Average in Skill and Ability	28	3	21	10	42	15	28
	POOR WORKER Lacks Skill and Ability	0	0	2	1	0	0	1
	Summary		11		47		36	94

TABLE XLVI

CHANCES FOR OBTAINING VARYING EMPLOYERS' RATINGS OF CO-OPERATIVE APPRENTICES WHO HAVE EARNED A-B-C-D-E MARKS IN TRADE SCHOOL SHOP WORK (1934 AND 1935 YEAR GROUP)

Trads School Shop Teachers' Marks

		A		B		C		Total
		%	N	%	N	%	N	
Employers' Ratings	Excellent Worker	61.5	16	39.3	13	46.1	6	35
	Average Worker	38.5	10	54.6	18	46.1	6	34
	Poor Worker	0	0	6.1	2	7.7	1	3
	Summary		26		33		13	72

1. From ratings by the employer to the co-ordinator on the progress of the co-operative apprentices placed in 1931–32.

2. From ratings by the co-ordinator on the progress of the co-operative apprentices placed in 1933–34.

3. From ratings by the employer to the author of this thesis, on the progress of the co-operative apprentices placed in 1934, 1935, and 1936.

1. *Employers' Ratings to the Co-ordinator.* The co-ordinator checks on the progress of the boys by having the foreman or superintendent, depending upon the size of the plant, rate the boy on his attitude toward the work, the quality of work he is doing, and his rate of speed. The ratings are in terms of excellent, good, fair, and poor.

These boys are rated at various periods of time. The ratings are shown in Tables XLIVa, XLIVb, and XLIVc. They are the averages of several ratings; in some cases, two, in other cases, three. When the various ratings were compared, it was found that in general the foreman's or superintendent's first rating was usually the same as the second or third rating.

These tables show that boys selected for co-operative work are evidently meeting the needs of the employer, and that some agreement is found between shop instructors' marks and employers' ratings.

We do not find any of the employers rating the boys poor. This may be explained by the fact that no co-operative apprentices are placed on the job if rated poor by the shop instructor. The tables show that approximately 9 out of 10 boys were rated by the employer as excellent or good in attitude; approximately 3 out of 4 were rated excellent or good as to the quality of work they were doing; and approximately 2 out of 3 were rated as excellent or good as to their rate of speed.

2. *Co-ordinators' Ratings on Boys Placed in 1933 and 1934.* Since it is not good policy to bother the foremen with too many ratings on their apprentices, the writer asked the co-ordinator to rate the boys placed on the job during the years 1933 and 1934.

The co-ordinator's ratings were based on the following classifications: (*a*) excellent worker, above average in skill and ability; (*b*) average worker, average in skill and ability; (*c*) poor worker, lacks skill and ability. His ratings were not to include his school impressions of the boy and were to be confined entirely to his contacts with the employer and the boy on the job. These ratings, are shown in Table XLV.

These ratings made by the co-ordinator are somewhat higher than those made by the employer on the apprentices placed in 1931 and 1932. These higher ratings of the co-ordinator may be due to several reasons: Ability to rate better; because he has before him the picture of hundreds of co-operative apprentices who are working in many plants and under varying conditions; a carry-over of some school impressions into his ratings; improvement in the training of the boys in the C. B. Connelley Vocational High School; and availability of better trained boys during the years of the depression.

3. *Employers' Rating on Boys Placed in 1934 and 1935.* A third approach to this question of relationship between shop teachers' marks and employers' ratings was made by the writer of this thesis, interviewing employers who employed the largest number of co-operative apprentices. It was made clear to the employer at the time of the interview that an unbiased rating was desired. As this interviewing took considerable time, the number of cases was limited. The results of these interviews are shown in Table XLVI.

These findings agree more closely with the co-ordinator's ratings on the 1933–34 group than the employers' ratings on the 1931–32 group. As they include boys placed on the job during 1934–35 and some in 1936, it looks as if a better selection of boys was available for co-operative apprentice work in 1934–36 than in 1931–32.

The three approaches to the questions of relationship between the shop teachers' marks in shopwork and those employed show that the shop teachers' marks select a greater proportion of boys who make good on the job than of boys who do not.

The ratings by the employer and the co-ordinator were made with no knowledge of vocational-high-school shop teachers' ratings. Employment ratings were obtained and then checked against trade-school records.

Summary of Findings

Boys Who Found Their Own Jobs. The employment questionnaire postal card mailed to 1,580 boys, of which 366 replies

were of value in this study, revealed the following facts:

1. Boys employed at their own or related trades earned on the average 16 cents per hour more than those working at nonrelated work.

2. Boys employed at their own or related trades spent a longer time in the vocational high school and earned higher marks in shopwork than those employed at nonrelated work. They also spent a longer period of time in the vocational high school and earned higher marks in shopwork than those boys who were unemployed.

3. If level of employment and earnings is used as criteria of success in employment, then shop teachers' marks and length of time in the vocational high school, select those boys most likely to succeed in employment.

Boys Placed by the Co-ordinator of the C. B. Connelley Vocational High School. A comparison of the shop teachers' marks and the employers' ratings on the boys placed as co-operative apprentices shows the following:

1. Boys making A or B in shopwork have better chances of rating higher with the employer than boys making C in shopwork. No boy was rated poor by the employer. This may be due to the fact that these co-operative apprentices are more or less a hand-picked group of boys recommended by the shop teacher as his best boys at the time of placement.

2. Both co-ordinators' and employers' ratings of the boys are higher when attitude, quality of work, and speed at which work is done, are shown in composite terms, such as an excellent worker, an average worker, or a poor worker, than when rated as separate factors.

3. The agreement found between employers' and co-ordinators' ratings and shop teachers' marks helps to establish confidence in shop teachers' marks.

Conclusion and Inferences

The formula suggested in Table XXXVI for selecting applicants to the trade school is not a perfect instrument. It is offered as a means to help improve the selection of boys applying for admission to the trade school. If it can keep out the boy not fitted for trade work, it will save the time and effort of the boy and conserve the tax dollar used for schools.

The formula has in it a measure of skills and interests, as shown by former school teachers' marks in shopwork; it has in it a measure of intelligence and study habits as shown by former school teachers' marks in the combined subjects of English, science, and mathematics and by the scores made on the Otis Self-Administering Intelligence Tests. By using the I.Q. rating as low as 95, it includes that large group of boys not especially equipped for formal schoolwork. The classroom teachers' mark discovers the boy who has put forth at least some effort to master a working knowledge of English, science, and mathematics within the scope of the 9th to 12th grades. The average score of 1.75 in the combined subjects of English, science, and mathematics is high enough to keep out the loafer, but not the boy somewhat limited in his academic ability. The former school teachers' marks in shopwork should discover the boy with average or above average ability in shopwork. If, after a tryout in the junior- or senior-high-school shop, the boy is unable to make an average of C or better in his shopwork, he is most likely a poor prospect for the vocational high school.

These findings should not be interpreted as placing a premium on academic achievement in former schoolwork. By using teachers' marks, we have other measures besides achievement in the given subject. Teachers in classwork and teachers in shopwork, as well as employers, are measuring many of the same things that make for success. Habits of industry, initiative, dependability, accuracy, and others, that were not listed as separate items, may be included in the teachers' marks used in this study. It may be that the relation found between success in classwork and success in shopwork in this study are due to these factors, as well as a correlation between intelligence and skill.

Intelligence is an important factor in trade work where interpretation of instructions is required in the doing of the job. Interpretation of instruction may involve the printed page, oral description, working drawings, plans or specifications, a mathematical or scientific solution of the problem. These involve a certain degree of intelligence and the more involved this interpretation becomes, the higher the degree of intelligence required. This varies with the trade and the type of job being done.

The age and the grade of the applicant need to be given some consideration along with this formula. It was found in this study that the boy entering the vocational high school between fourteen and fifteen years of age and of the ninth grade remained in school longer, but made higher teachers' marks in shopwork if he entered between sixteen and seventeen years of age and of the tenth grade. The best entering age and grade, however, varied somewhat with different trades.

It is a mistaken notion on the part of persons concerned with the guidance of boys in school, that failure in academic work is a signal for a transfer to the vocational high school, and that it is the function of the vocational high school to make skilled mechanics of all boys sent to it, irrespective of intelligence or aptitude for trade work. The findings of this study show quite clearly the fallacy of this procedure.

It may be that the solution of the problem faced by the educator in not knowing what to do with the boy who is failing in the regular high-school work, is the establishment of a third type of school where the simpler operations of production can be taught, where the knowledge required in the doing of the job is of a lower order and where repetitive operations are emphasized.

There is a place in our present organization of industry where boys trained in doing repetitive operations can find employment. The boy who is not making a success of his work in high school and who is not potential material from which may be made a skilled tradesman, may find his place in a school organized to teach repetitive operations. In this new school, the classroom teacher should use more of the concrete problems of life and less of the purely abstract problems. This school may also function as a preparatory school for trade work. When boys are discovered who possess those qualities that make for success in trade work that were not discovered in the former work, they should be transferred to the vocational high school. This new type of school can be equipped with less expensive machinery, use less expensive materials, and can reduce the per-capita cost of instruction below that of the vocational high school. It would solve many of the problems now encountered both in the high school and in the vocational high school.

A study of the needs for a school of this type is a challenge to those interested in research work in education.

Inferences

The size of the correlation coefficient in certain related classes raises some questions from an administrative point of view that deserves further investigation and consideration. For example, the correlations of related theory and related mathematics were found to be rather high. These correlations range from a low of .41 in the electric-power class to a perfect correlation of 1.00 in the machine-shop class. These higher correlations may be due largely to the fact that the same teacher teaches both subjects. In the case of the machine-shop class, the related teacher evidently used the same marks for both subjects, or at least varied them in such a way that the one mark balanced the other. This is probably a coincidence rather than deliberate marking.

These comparatively high correlations in related theory and mathematics raise the question from an administrative point of view of the need for separating these two marks. If the teacher is unable to differentiate between the related theory and the related mathematics due to the overlapping and interrelations that seem to exist, why make out two grades?

Partial correlations show that in some shops the related mathematics contributes more to the size of the correlation with shopwork than the theory; in other cases, such as the electrical trades, the related theory contributes more.

These findings suggest the desirability of combining these two marks into one teachers' mark, heading it Related Theory and Mathematics.

Another problem of interest is the curriculum implications shown in the size of the correlation coefficient between

related theory and related drawing, and related drawing and shopwork.

The size of the *r* of theory and drawing for the electric wiring, the electric power, and the radio shops, .37, .37, and .32, respectively, compared with .71 for theory and drawing in the telephone shop, may imply a curriculum problem that deserves further consideration. In a properly organized related-subjects curriculum, it is doubtful whether such differences as are shown between correlations of .32 and .71 are to be expected. The welding class with an *r* of .15 likewise deserves attention.

In the correlation of related drawing and shopwork shown in Table XXVIII, the size of the *r* in bricklaying and plumbing, .37 and .32 respectively, compared with .65 in carpentry seems out of line and may imply curriculum revisions. In the building trades, it seems to be commonly agreed that the emphasis should be placed on the reading and the interpretation of the drawings rather than on the making of drawings.

Another outcome of this study is its relation to the selection and placement of boys in part-time co-operative apprentice training. The co-ordinator in charge of this work attempts to match the boy's training with the requirements of the job. When selecting a boy for a job, the cumulative pupil record card is consulted. Age, grade, intelligence, teachers' marks in academic work, related work and shopwork and the attendance are noted. Upon these records, selection is made. It is, therefore, to the co-ordinator's advantage to know the relationship between these various items.

These findings show there is a relationship between classwork and shopwork that deserves consideration when selecting boys; that intelligence is a factor in shop success as are likewise, age and grade. Better selection, therefore, may be made when these factors are given due consideration in selecting and in placing boys for jobs.

Rear-axle department, high school automotive division

Creative Arts and Crafts In the Junior High School

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Go back twenty-five years with the writer, and picture him a lad of junior-high-school age busy with his art lessons. His art copybook is on the desk in front of him. He has finished the drawing of a cube and a cylinder, both nicely shaded; the railroad, flanked by telegraph poles, has been sketched to its vanishing point. At the moment, he is engaged in placing the highlights on a fine apple. He remembers with a bit of regret, that he resisted the desire to take a bite from this apple with his pencil and picture a worm startled by its sudden exposure. The idea was quite tempting, but the memory of a previous misunderstanding with the teacher over a mouse which had been inserted in a picture where no mouse was supposed to be, prompted him to resist the temptation.

The copybook was his art course. On the lower half of each page, he had to reproduce the picture printed on the upper half, not without a certain satisfaction in his accomplishment, but with no great joy.

Once every week he had shopwork which, at that time, was called manual training. The instructor had a large bulletin board to which was wired a model of each piece to be made. Each boy made, with no planning or choice on his part, a match scratcher, a matchbox, a whisk-broom holder, and a pen tray. Each member of the class started the same project at the same time. No one was allowed to complete the next step on any article until all were ready.

In the light of present-day knowledge as to the nature of the child at adolescence, it is not surprising that the boy's creative urge, at that time, found outlet after school hours, in crude but often painfully graphic pictures on fences and barn walls, or in fashioning guns and swords to repel the Indians who infested the block across the street. We can understand the urge which caused the gang to rush home after school to finish the tree house, or to dig the cave in the neighboring pasture a little deeper in order that the actions of our current hero, Jack Harkaway, in his adventures with that redoubtable brigand, Barboni, could be properly dramatized. There is no mystery to why we had our periodic flings at play production in the "Little Theater" of the barn — plays extemporized by the gang, costumes by the gang, scenery by the gang. The scenery, however, was conceived in the original Shakespearean manner and left mostly to the imagination. Unfortunately, there was no one who would help us do better many of those desirable things we were going to do anyway.

The formal educational development of this period can be compared to the development of the automobile of the day, the car with the slow, noisy, intermediate, and the difficult shift into high. Today, while some of our educational systems are riding in outmoded models, many are approaching the 1939 creation with its ease of operation, its smooth, swift, silent intermediate, and its easy shift into high.

Outcomes that may be expected if industrial-arts work is given the proper emphasis in the junior high school.

Shifting the Emphasis

In the schools of the past, the arts and crafts were taught with the primary emphasis placed on developing skills. Coming into our curriculum as they did, with no traditions of their own, it is regrettable, but not surprising that the formalism of the academic subjects should be adopted and that the arts and crafts were as isolated by their *subject-matter-centered* instruction, as were Latin, mathematics, and history. In spite of the fact that the arts and crafts dealt in materials which the majority of the pupils used habitually, no attempt was made to find a connection with life, and little or no attempt was made to consider the interests of the child.

In this school of the past, education

missed an opportunity to improve living, by failing to realize how many interests the arts and crafts encompass; it failed to envision the richness and intellectual interest which they inherently possess in larger quantities than do almost any of the other subjects. It failed to recognize the heritage of the arts and crafts with its vast array of materials and processes, its inventions changing our whole social and economic life, the part it played in the history and development of our race, and the part it must play in our future.

Psychologically, arts and crafts should have creative activity as its approach to learning; activity is the natural way because it satisfies the innate tendency to manipulate. It has been well said that "all children are hand hungry." Where provision is made for the children's investigative, artistic, and social impulses they will find satisfaction and success in sharing interests and activities with others. From such experiences must come appreciations, knowledges, and skills which will broaden vision and enrich lives.

Applying the Industrial Arts

Examples may be cited of how this urge to create, to be individual, to give free reign to one's imagination, has been captured and turned into worth-while channels. Probably one may not truthfully say that these examples represent a part of a continuous practice in our junior high school; rather, they represent a type of work whose frequency is increasing as we gain confidence in our own ability and recognize the latent power of the adolescent child.

Thus, the other day in the auditorium of a large junior high school, the writer watched with pleasure, not untinged with envy, a group of young craftsmen giving the final touches to a stage for a Christmas pageant. In the center was a huge Gothic window with its beautiful stained glass forming a picture, the central theme of which was an angel. The young technicians from the shops were testing their lighting effects. Through the window came a soft glow, lighting with just the proper depth for the inside of a cathedral setting.

There was a story behind this project. To make it a success a whole community of craftsmen was formed in this school. The dramatic class wrote up general specifications for their stage settings. A study was made of Gothic windows and stained glass. The members of the art class submitted designs, chose the best features of several and made the final draft. This was drawn to scale and materials and construction were discussed. Further modifications were made and the plans for the frame sent to the shops. In the meantime, the glass and the tracery of the lead were laid out, the craftsmen using a medium which at a distance was very realistic. The industrial-arts shops made the altar, the seats, and designed and constructed the floodlights. The graphic-arts shop designed and printed the tickets and the programs. A well-planned advertising campaign was carried on by posters and by articles in the school paper.

How familiar we are with usual procedure which is to wait until the zero hour and then ask for help. The distracted teachers, with a few hand-picked pupils, must do all the designing and work long, tedious hours, while a fine opportunity for creative work and co-operative endeavor is lost.

On another day the writer visited a class where the teacher is a disciple of the creative movement. The room was a veritable laboratory — there were not only arts desks, but also workbenches with tools for every purpose, looms, a printing press, a jig saw, and storage bins filled with clay, cement, and plaster. As an incentive and inspiration to others, there were products of the pupils' work in display cases. One group was working on designs for textiles, another modeling in clay and casting in plaster the parts of a frieze portraying various countries which was to be placed on the walls as a part of the permanent exhibit. One boy was cutting a linoleum block depicting the old Shawnee Mission on the Santa Fe Trail just west of Kansas City. This boy later won a national prize for this particular linoleum block. Other pupils were making lamp bases of colored cement, grotesque totem poles, strange toys, and an airplane or two. All of these activities were in one class and no two designs or jobs were the same.

In a similar laboratory, a class had just finished a project of which the pupils were justly proud — a marionette show with all of its paraphernalia. The pupils had written the play, planned and built a folding stage and scenery with the help of the wood and metal shops, and fashioned thirty marionettes and their costumes. The project necessitated the study of marionettes, their construction and manipulation, and practice in projecting personalities into the little figures. This activity was a co-operative endeavor which paid large dividends in satisfaction and success. After their opening night before a large group of patrons, they were literally deluged with invitations to appear before various civic and private groups.

Another project which had an integrating effect on a large junior high school and on a whole community was the beautification of two blocks of unsightly, neglected land just across the boulevard from the school. The impetus was given by a civics class, and the school paper had several editorials decrying the ugliness of what was really their front yard. Representatives of the student body and patrons called on the civic park board several times and finally, in order to sell their idea to the city fathers, agreed to furnish a plan for a park. The boys from the graphic-arts shop made a topographical map of the plot. The art classes made the plan which was to include the trees and shrubs, paths and roads, tennis courts and baseball diamonds. After a landscape architect had been consulted concerning some technical details and for final criticism, a scale model in plaster was constructed. The community now has a park made according to the school plans and named for the school. The social values of such a project cannot be measured but the pupils certainly were placed in a life situation which furnished the interest for real creative effort.

Studying Student Interests

Four years ago, following a three-year study of boy interests and a concerted effort on the part of all the industrial-arts teachers to promote a better use of leisure, a survey was made of the 11,000 boys taking shopwork, for the purpose of determining how many had shops at home and what they made in these shops. The survey showed that over half of these boys had home workshops and half of this number reported that their fathers worked with them. The number of tools, machines, and workbenches made in our shops for home use is growing. One item of particular interest is the number of small machines made in the schools. In the past four years, over one thousand of these machines have been made by boys in our classes in metals. These jig saws, lathes, drill presses, and band saws have gone into the homes of these boys to form the nucleus for many workshops.

The list of articles made in the home shops was astounding and covered the fields of radio, aeronautics, ceramics, carpentry, cabinetmaking, printing, ornamental plaster, art metal, the making of archery and fishing tackle, weaving, and many more interests that space forbids enumeration. The survey proved that arts and crafts function in the lives of our children and beyond a doubt have their effect on the community.

In any school system which has felt the impact of progressive education, the creative arts and crafts will be one of the most real and vital offerings in the curriculum. These subjects taught in the progressive manner will know no boundaries and will cut across every area represented in the school.

Creative arts and crafts will function in our junior high schools by enhancing the joy born of freedom of action, by satisfying the desire of the adolescent child to be individual, and by gratifying the urge to create. Talent will be discovered and matured rather than shaped to the average mold. The arts and crafts will function by developing the aesthetic or artistic side of the child's life and will provide rich and varied experiences for worth-while leisure, experiences that will be of immediate as well as of future value to the child. They will furnish a general knowledge of industry and materials, and supply information concerning occupations which will contribute to "vocational and economic efficiency." It is difficult to conceive of a more fundamental phase of education than this interpretation of the creative arts and crafts if we are truly concerned with developing an efficient citizenship in a great civilization.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

An Anomaly

A college professor, in addressing one of the sectional meetings of the American Association of School Administrators recently held at Cleveland, Ohio, is credited with the statement that school authorities made a great contribution to creative intellect when they expelled Thomas A. Edison. According to the professor, Edison was thrown out of school after a few months, because those in authority thought the meager funds would be better spent on other pupils. If they had kept Edison in school and "dragged him through the curriculum and its attendant rituals, the keen edge of his mind might have been dulled and its creative impulses destroyed."

America surely must feel thankful, after hearing or reading this frank statement, that Edison escaped the devastating influence of receiving an education. It would really have been just too bad, had the intellect of this renowned genius been stunted in his youth.

Can the reader imagine one of the representatives of our large American airplane manufacturers publicly making the statement "Our firm has made a great contribution to the success of the growth of Graustarkiana's air force by refusing to build 300 airplanes for them. What with the inefficiency of our planes, they might have had many bad crashes and failures."

In effect, the professor is reported as making about the same kind of statement about education. A little browsing about in history will show that at the time Edison did not get his education, there were other geniuses who became quite noteworthy because of their inventiveness in spite of the fact that they were subjected to the best educational advantages afforded by their times.

Take, for instance, Alexander Graham Bell. He and Edison were both born in 1847. Bell, too, was an indefatigable worker and experimenter, and his genius has greatly benefited human progress. He received his preparation for his life's work by attendance at the University of Edinburgh, and at the University of London.

Westinghouse, born in 1846, and known for his mechanical and inventive skill, registered at Union College, Schenectady, to increase his engineering knowledge.

Nikola Tesla, another inventive genius was born in 1857. He studied at the polytechnic school at Graz, Croatia, and at the University of Prague.

Steinmetz, the electrical wizard, was born in 1865. More than 200 patents were issued to him through his lifetime. His educational preparation at Breslau, Zurich, and Berlin prepared him for the role he was to play during his lifetime.

Charles Martin Hall born in 1863 would, most likely, never have experimented with the production of aluminum had his imagination not been fired by the remarks of Professor Frank Jewett at Oberlin College.

Many more names could be added to those already listed. That, however, is really not necessary. Most men in the audience who heard the general statement about Edison, no doubt, did not lay any great stress upon the utterance that an education might have harmed him. His fame is secure. He was one of America's greatest geniuses. Let us be thankful that Providence gave this man the energy and the perseverance to wrest from books and from personal observation and study, the education which had been denied him.

In the meantime, however, let us as educators improve ourselves and our offerings so that it will become progressively easier for geniuses to develop because of the education which we afford them. Educators themselves must be impressed with the benefits which they confer, and refrain from making such cynical, senseless, and untruthful statements, lest the world receive the impression that they be charlatans who pose as giving something to mankind which they do not give.

The Boy Who Excels

Much has been written about what the school can do with regard to the retarded child, and the problem child. It is well that the school takes these various types of students into account, and arranges special classes for them, and makes every effort to help them advance, and to prepare them in the best possible manner for a place in life suitable to their capacity and ability.

These retarded children, however, form only a small percentage of the total school population, and there are other groups who present problems just as serious or even more troublesome. It is quite common to plan classroom work for the average student, overlooking entirely that there also are superior students to whom the work as outlined is no real challenge. It is true, there are many teachers who have already recognized this problem and are working toward its solution. Much needs still to be done, however. The superior boy is usually the wide-awake youngster with abounding energy who knows how to direct others and who will most likely not go in the right direction if there is enough fun and hilarity in taking the opposite way. Such a youngster will become a bad influence in a class, and he himself may build up antisocial habits if not curbed in time.

It is well, therefore, to be on the lookout for these superior students and help them orient themselves by giving them work that taxes their real ability and capacity. It is out of this group that many of the executives of the future will be developed. They can learn much in secondary school that will stand them in good stead later on when they take their place in business or industry.

It is out of this group, too, that our future instructors of industrial arts and vocational education may be obtained.

Shop teachers should, therefore, take a real interest in the brighter boys of their classes and guide them into the positions for which their superior abilities and achievements fit them.

The Laboratory of Industry

The question of whether one instructor, teaching several activities in a general shop, can give his students as much as he could were he teaching but one subject at a time to the entire class, frequently comes up for discussion in shop-teacher groups. There are, of course, many teachers who have

taught under the unit-shop method for many years. It will be almost impossible to convince some of these men that the general-shop method can possess merit. A little calm thinking about the subject may not come amiss, however.

Almost any shop teacher knows co-workers who have taught three, four, or more shop subjects in the course of a week, for years. If this is true, these teachers must evidently be conversant with the methods required in working with a variety of different materials. Having this knowledge, it is not so difficult to conceive of such a teacher having the ability required to change quickly and easily, say, from woodwork to drawing, then to metalwork or to printing, or to ceramics. Or must we assume that it is possible for such a teacher to change from one subject to another only at the end of a given class period? There are teachers who evidently have that idea.

It seems so futile to discuss this question, because there are quite a number of these general shops and laboratories of industry in existence. Not all of them are outstanding, it is true, but the outstanding classrooms in any subject are in the minority. The very fact, however, that there are some outstanding examples of this kind, shows that the idea is feasible and workable.

The laboratory of industry has its advantages which make it especially applicable in many cases. Where classes are small, the laboratory is a very good solution of the shop question. Even in larger schools, it serves a very good purpose, because of the economy which it makes possible. Instead of equipping a number of unit shops with a full complement of tools and equipment to take care of the usual thirty to thirty-five students for each subject, the various activity areas in the general shop need to be equipped with but a small part of the total complement of hand and power tools.

The laboratory also has the advantage of presenting to the student a more concrete understanding of the interdependence and correlation of the different activity areas, and the materials and tools used in each.

It is well, therefore, that shop teachers study this method of instruction sympathetically. Just as the old-time skeptic found out to his amazement that the locomotive did run and that it could be stopped, so the general shop, or the laboratory of industry, as it is coming more commonly to be known, can be properly managed, and does answer a very specific purpose.

Assisting the Administrative Head

Again and again the comment is heard that certain superintendents of schools, as well as school principals, are very apathetic or even antagonistic to industrial-arts work. Of course, a great many of the old-time school administrators are still of the strictly academically trained schoolman type, who have had little contact or participation in any work of an industrial nature. It is quite understandable that their scholastic preparation does not lend itself to a ready comprehension of the need of a practical education for the youngsters now going to school.

As time goes on, there will be fewer and fewer executives who have not had at least some industrial-arts shop experiences in their own school days. But the cause of industrial arts cannot wait until this has happened. The industrial-arts teacher, however, can do much to help his principal or his superintendent arrive at the right concept of the need for retaining or including industrial-arts work in the curriculum of the elementary and secondary schools of today.

Then, too, there is another side to this question of superintendent-department relationship. The superintendent is hemmed in on all sides with restrictions placed upon him by his board, by the public, by the parents of the children who attend his schools, by community finances, by special groups, and by the heads of the various existing departments. He must be well informed on the activities of a given department if he is to act as its champion.

One of the best methods of assisting him to get the right kind of information is to call his attention to articles favorable to industrial-arts work written by men who themselves occupy administrative positions in public-school systems. Such articles written by men of their own kind will probably make a greater impression on the administrative heads than if they are written by men from our own ranks. Articles of this kind appear not infrequently in the professional periodicals commonly read by the teachers of industrial arts and vocational education. They are there to be used in just this way.

Then, too, we have an increasing number of scholarly writers in our own ranks. Such writers as Dr. Ashley, Dr. Bawden, Director Bedell, Dr. Bennett, Dean Bowman, Dr. Fleming, Dr. Fryklund, Professor Hunter, Professor Mays, Principal Moffitt, Dr. Myers, Dr. Newkirk, Assistant Superintendent Schweickhard, Dr. Smith, Dr. Warner, and many others have written and published material which may well be called to the attention of educational administrators. The standing of all those mentioned is so high that their word carries great weight even outside our own ranks.

Then, too, there is an ever-increasing number of teachers of industrial arts and vocational education who have earned higher scholastic degrees. This is a good indication that teachers of shop subjects are exceedingly anxious to improve themselves. With this raising of standards in the teacher group, there is naturally an increasing number of these men appointed to such positions as supervisors, directors, principals, assistant superintendents, and even as superintendents.

Another thing that the shop teacher should not forget is, that he must make his presence felt if he wants recognition. It is he who must work up the publicity program for his own department. This must, of course, be done so it sheds the light of approval not merely over the teacher or the department of industrial arts, but over the entire curriculum of which industrial arts is an integral part. He must not shirk any opportunity that offers to advance his department, and he must evince his interest in the outside activities of his students through guidance and often through direct participation. There are many chances for doing this. Contacts with the student and his home can be established, for instance, by periodic visiting. Special help may be given in arranging and outfitting home workshops. Help may be provided in obtaining materials, supplies, and suitable projects, and assistance given in organizing home-workshop clubs and guilds.

The instructor of industrial arts must always remember that the duties of his position are not closely delimited. As with any industrial job, preferment and advancement is based on production, and only that teacher or that producer in the factory who does a little more than is expected of him will ever draw attention to himself or the department which he represents.

Spelling for Printing Students

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Correct spelling is a prerequisite of a good printing-trade employee, whether or not he is employed as a proofreader. In most printing plants, the machine operators and hand compositors are expected to know the correct spelling of the words they set in type. Very often, because of the speed in getting out the jobs in publishing and printing, copy is not given the necessary care in editing. Even in edited copy, now and then a few words get by misspelled. If the man who sets the type is competent, he can correct these words at the keyboard or case, and save time in corrections and probable errors in the finished job.

In the professional areas of printing and publishing, there is little argument against the importance of correct spelling. Foremen and superintendents are called upon to do proofreading on some work in many plants. Likewise, a report to the owner or manager on some phase of plant work must be couched in good American-English, and written with words spelled correctly.

It is the consensus of opinion among many printing teachers, that spelling, as taught in regular English courses in high schools, is not adequate for the printers' needs. It is not the purpose of this article, however, to criticize the work done in teaching spelling in the schools. Perhaps they are meeting the needs of the average group of graduates. The question is whether or not this type of education meets the needs of those who will work with words and type — those who must get them correctly spelled in printed matter, and so spelling is found in many of the courses devoted to printers' English, along with word division and punctuation.

First Considerations

In spite of the popularity of spelling bees or contests in some schools and over the radio, the printer does not spell his words aloud; neither does he write them from some person's dictation, *He finds them spelled correctly or incorrectly in copy prepared by some customer*. He finds them in longhand or in typewritten copy. He finds them in proof — in print. He must recognize whether or not they are misspelled in his type composition and in his proofreading. So it seems logical that a lifelike situation should be set up in the learning of correct word spelling.

What Words Should Be Taught?

In a mixed group in any junior, senior, trade, or vocational high school, we find students from many different public and parochial schools. Usually there is no evidence that a particular student can or cannot spell well enough to work at printing. This can be determined by pretests, however.

One problem in the teaching of printers' spelling is the selection of a list of words. This can be done in various ways:

1. Investigation of a number of the many studies in the field of spelling on words found to be most commonly misspelled.

2. Examination of the spelling texts now on the market.

3. Investigation of the words most commonly misspelled in newspapers and in commercial printing.

By any or all of these methods, a teacher of printer's spelling can select a good, functional, and usable list of words which will aid him in teaching spelling. This list will, no doubt, be a growing and a changing thing. Obviously words which all the class members spell correctly may well be thrown out of the list, and other tried words added.

Some teachers are prone to select the lists, and then present them orally to the class. In the grading of the papers, they then decide on a mark for that section of the course. This is testing what has been learned before in some other institution, and should be considered a pretest. It can hardly be considered a good course in spelling for printers. This is true mainly because there is usually no follow-up to see if individual students have learned the words they have misspelled on some such pretest. Also, the dictation of words is a false procedure, as it differs greatly from actual working conditions in printing.

A Plan for Teaching Spelling

1. A list of words known to be commonly misspelled was built, and these words were placed in sentences usually following the style found in printing and in newspaper work. Most of the words in the list were misspelled in the copy. The entire list was made up into sections having 100 words in each, which students seem to be able to complete in 45-minute to 1-hour periods. The total number of lists is determined by the amount of time which can be devoted to the teaching of spelling in the course.

2. In the pretest, students checked through the sentences, and when they noted a misspelled word, they wrote it correctly in the space at the right of the sheet. See spelling lists Nos. 1 and 2.

3. The papers were checked, and words not spelled correctly in the marginal space were marked with an X, and returned with a master list of the words correctly spelled.

4. Students then knew what words they did not spell correctly, and were required to study them, in preparation for the mastery test.

5. The sheets used by the students were then brought to class, and an identical list was given to them. By comparing the pretest (first list) with the mastery test (second list), the students were required to spell the words they missed the first time.

Adapting studies to situations as found to exist under lifelike conditions.

6. A good measurement of the students' growth could then be measured in spelling accomplishment by comparing the score on the first test with that of the mastery test. That is, if a student made a mark of 60/100 in the pretest, for example, he was required to take over (in the mastery test) the 40 words misspelled. If he earned a mark of 35/40 in this second test, he showed that he had made reasonably good progress in learning to spell words he did not know. These marks can easily be reduced to per cents with the aid of a slide rule or a computation table.

7. At the close of the *spelling unit* of work, a final test was given to the class as a whole on the words misspelled in the mastery tests, as a further check on student progress.

8. In the trade and professional areas, standards can be set up for accurate scoring with co-operation of local printers and publishers. If a dozen or so compositors were to take the tests, and make an average score of 92, this would be the *trade standard* at which to shoot in the course.

The tests can be set up for self-administering, otherwise there is some burden on the teacher, unless he has clerical assistance in scoring papers. The use of a key for this work makes it possible for almost anyone to mark the papers.

Spelling List 1

Course: Printers' English I

Date..... Section.....

Last Name..... First Name.....

Instructions: If you find a misspelled word in any of the sentences below, write that word correctly in the space at the right:

1. He uncovered his head in abeisance. .....
2. The king may abdicate. .....
3. The aquestrienne fell from her horse. .....
4. The tooth had one abcess. .....
5. You are absolutely correct. .....
6. Your suggestion is abserd! .....
7. Geology gives one an abysmal extent of time. .....
8. The plane fell into an abys. .....
9. We have an abundence of crops this year. .....
10. The flowers were abundent. .....
11. His aceptence came too late. .....

12. A worker accidentaly broke his leg. .....
13. I'm sorry I can't acommodate you. .....
14. The foreman was accompanyed by the superintendent. .....
15. In acordence with your late request . . . .
16. Slugs must be accurrate in dimensions. .....
17. The pressman was not acustomed to late work. .....
18. The bacilus squirmed under the microscope. .....
19. He is no friend — just an acquaintence. .....
20. We are well acquainted. .....
21. Must I be the one to acquiesce? .....
22. He should aquire more knowledge. .....
23. The jury may aquit him. .....
24. A ship sailed near to the attol. .....
25. Our press equipment is not adeqate. .....
26. Our meat is prepared in an abbattoir. .....
27. The apossum climbed the tree. .....
28. The adminestration of the test is difficult. .....
29. Admision was ten cents. .....
30. She was still in her adolesence. .....
31. Jones adapted the boy through the courts. .....
32. Advertizing helps the newspapers. .....
33. It is not advisible to go there at night. .....
34. The radio ariel fell down in the wind. .....
35. We have the greatest effection for you. .....
36. She effectionately stroked his cheek. .....
37. I was agast at his conduct. .....
38. It is agreable that we do so now. .....
39. Alfalpha grew in the field. .....
40. His egotism is an effrontery. .....
41. His allowence was cut. .....
42. Allright, I shall be there on time. .....
43. Spots of axzema disfigured his face. .....
44. This amity of the opposing parties is good. .....
45. Our amunition ran low. .....
46. We have ampel crops this year. .....
47. What shall we do for amusment? .....
48. She seemed to be aenemic. .....
49. The analogy between the two is this: .....
50. This is my analesis of the trouble. .....
51. The mountain passage was affected by force. .....
52. This angel is sharper than that one. .....
53. Great animocity was shown at the meeting. .....
54. Today is our tenth aniversery. .....
55. The anouncement was received in silence. .....
56. The editor received an anonimus note. .....
57. We antisipate the strike soon. .....
58. I will apologise for my remarks. .....
59. The aparratus was set up for the experiment. .....
60. Aparantly the newspaper is late today. .....
61. The operation was for apendisitis. .....
62. The assemblyman was burned in affigy. .....
63. Our sick friend was quite amaceated. .....
64. He had a stroke of appoplexy. .....
65. The photographer used this amultion on the negative. .....
66. It was an apropriate remark. .....
67. This machine is the aquivelant of the other. .....
68. Stanhope and Earl arrived very apropo. .....
69. No fish were in the acquariam. .....
70. The acqueduck is now empty and not is use. .....
71. An argumant was in process over the work. .....
72. Arrangments have been made for the dance. .....
73. The assent to the top was a hard climb. .....
74. He lived the life of an acetic. .....
75. This gas will axphixiate us soon! .....
76. A press assosiation was formed. .....
77. We are assurred of a raise in pay. .....
78. Atheletic news appears on page four. .....
79. The atmosfere is quite humid today. .....
80. Printers of old called errors "arrata." .....
81. The enemy attacked us at dawn yesteray. .....
82. The class attendence is good. .....
83. Your atitude in class must improve. .....
84. It was an attractive machine. .....
85. The avangalist spoke of Christ. .....
86. He is a bachelor. .....
87. The child fell over the baluster. .....
88. The radio needs no battry. .....
89. Behavior in class is very good. .....
90. The sunshine is benificial to plants. .....
91. He had a benine expression. .....
92. A benifit bridge party was held. .....
93. The border of the job is not bevelled. .....
94. His was a biased opinion. .....
95. The blizzard howled around the house. .....
96. The breadth of the cloth is short one inch. .....
97. She suffered from broncal trouble. .....
98. Buracracy or democracy? .....
99. A bullitin on the late news was issued. .....
100. A bergler forced an entrance to the house. .....

Spelling List 2

Course: Printers' English I

Date..... Section.....

Last Name..... First Name.....

Instructions: If you find a misspelled word in any of the sentences below, write that word correctly in the space at the right.

1. A callamity befell the voyagers. .....
2. He hung the calander on the wall. .....
3. She was about to calcimime the wall. .....
4. "This is calumny!" he cried. .....
5. The problem was followed by a corolary. .....
6. Campher was in the chemist's test tube. .....
7. The postmaster was cancelling stamps. .....
8. Jones was a canidate for sheriff. .....
9. The tent was made of canvass. .....
10. He can not come. .....
11. The capasity of the can was one quart. .....
12. Murder is a capital offense in this state. .....
13. The cartilege was broken in his spine. .....
14. She chose the stage as her carreer. .....
15. A cast system is practiced in India. .....
16. You must not place him in that category. .....
17. We will celibrate the holiday here. .....
18. He suffered from catarh. .....
19. My chagrin was hard to bear. .....
20. Chloraform was used in the operation. .....
21. A chrysanthemum bloomed in the garden. .....
22. The ceder trees made a green background. .....
23. Vegetables were placed in the celler. .....
24. Cinammon was an ingredient of the pie. .....
25. In her opinions, she is very changeable. .....
26. The note was in cipher. .....
27. One officer was in civillian clothes. .....
28. These two chemicals will coalesce. .....
29. There stands a man of good character. .....
30. Mary inherited the estate in the codicil. .....
31. Give, for sweet charety! .....
32. The comparitive degree is used in grammar. .....
33. A chaufer entered the automobile. .....
34. I shall compell him to do so! .....
35. The compitition was about to begin. .....
36. There is no need now to concilliate them. .....
37. A concensus of opinion was taken. .....
38. The wounded man will soon convelesce. .....
39. A bird perched on the coping of the house. .....
40. The ball carromed about the pool table. .....
41. Corderoy suits are now on sale. .....
42. She stared cooly at the intruder. .....
43. The coterie met for dinner. .....
44. And thus the cival war began. .....
45. The store will hold a clarence sale today. .....

46. They knew not what to do in these crises. .....
47. The mob callously watched the hanging. .....
48. His relations will at least clothe him. .....
49. Robbers cudgeled him into insensibility. .....
50. He made a comicle gesture. .....
51. Comercial printing was done there. .....
52. His army comission expired. .....
53. A catydid sang in the bushes. .....
54. The native's cayak sped through the rapids. .....
55. Conserning that, I have nothing to say. .....
56. The Chinese coolie cowtowed before us. .....
57. Can you condem her? .....
58. A conferance was called on Monday. .....
59. Do not betray my confidance. .....
60. Congradulate me — I'm married! .....
61. I believe that our calcalations are correct. .....
62. Her consiance bothers her. .....
63. I claim to be a consientious man. .....
64. Was he concious after his fall? .....
65. Wait and see the consequences of this act. .....
66. The Linotype ticked away constently. .....
67. The guns boomed continualy. .....
68. We made the job more conveniant for her. .....
69. It is best to co-operate. .....
70. I am most cordialy yours. .....
71. Please be courtious to the customers. .....
72. Cadium plated tools resist rust. .....
73. Critecism should be made editorially. .....
74. Who are you to critisize me? .....
75. Mother will croshay mittens for you. .....
76. A crystle pool was found in the valley. .....
77. My couriosity was aroused. .....
78. The engine had six cylindars. .....
79. He was a dealor in furs. .....
80. The judge handed down his decisian. .....
81. Then we shall declair war! .....
82. Have you no defence for your actions? .....
83. A real estate developement was started. .....
84. He is not capible to do the work. .....
85. You are most disagreable! .....
86. His orders were definate. .....
87. Discribe her to me, please. .....
88. The derilict floated away. .....
89. Should we desicrate this graveyard? .....
90. A desperate criminal escaped. .....
91. He lived in a dilapitated old house. .....
92. Dilegent watch may yet save us. .....
93. The milk was dilluted with water. .....
94. Age did not diminish his long stride. .....
95. This disability does not handicap me. .....
96. His arm muscles may now constrick. .....
97. The pie was deliceous. .....
98. We have to descend into the pit to save him. .....
99. It is desirable that we do so. .....
100. His pronunciation is very good. .....

Effectiveness of Educational Motion Pictures

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An extremely interesting and significant fact which should be of value to all educators, and particularly to those in the field of vocational education, has been uncovered as the result of an experimental research study which formed the basis of the writer's doctoral dissertation. The study, undertaken to show the relationship between acquired information or knowledge obtained from certain educational motion-picture films, and intelligence, grade, age, sex, and type of educational training of the pupils, revealed a number of important facts.

It shows definitely the effectiveness and importance of educational films with prevocational classes. One phase of the experiment consisted of showing the films to groups with different types of educational training. These groups included adults in evening and college classes, elementary-grade classes, high-school classes, and prevocational, and vocational classes. All of these various groups were tested for intelligence and for their comprehension of the subject of the films, so that it is possible to compare the relative effectiveness of the educational films with different groups.

In the intelligence group with an I.Q. range from 110 to 90, the results of the film-comprehension test, as a whole, show that the vocational group is surpassed only by the college-preparatory high-school classes. These higher ratings of the vocational classes hold despite the fact that the vocational groups are considerably below the scholastic standards of the regular classes. The vocational groups have a higher mean score than either the grammar or regular high-school classes. The mean scores on the film-comprehension tests Nos. 1 and 2, for the various groups, are given for comparative purposes in Table I.

TABLE I

	Mean Score	
Group	*Test No. 1*	*Test No. 2*
College-preparatory classes..	35.1	34.7
Vocational classes	34.2	33.
Prevocational classes	33.8	30.
High-school classes	32.9	32.8
Elementary-grade classes ...	32.8	30.6

In the matter of observing details shown in the motion pictures, the data show that the vocational classes lead all other groups. Further study of these data shows that the film scores of the vocational group with an I.Q. range from 110 to 90, compare favorably, and in some cases exceed the film scores of the I.Q. group above 110 in certain other groups.

An examination of the research reveals equally interesting and important facts concerning the prevocational classes. The prevocational group have a higher rating on the first film-comprehension test and approximate the grammar- and high-school group on the second film-comprehension test. This favorable rating holds although the scholastic ability of this group is even lower than the vocational group's. Yet, even though there are no pupils in the prevocational classes with an I.Q. above 110, their mean scores on the film-comprehension tests compare favorably with those in the regular elementary-grade and high-school classes who have an I.Q. above 110.

These facts indicate definitely the need and practicability of using more educational films with prevocational and vocational groups. The pupils in such classes are apparently able and willing to learn when the subject matter is presented by means of visual aids. Through the use of educational films it should be possible to bring the work of the prevocational and vocational classes close to the scholastic level of the regular classes.

The results of a study submitted in partial fulfillment of the requirements for the degree of doctor of philosophy.

Lesson for Young Workers — IX

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The ninth of a series of suggestive lessons designed to help students of industrial arts and vocational education.

The Middleman

New wants or desires on the part of the people stimulated invention, and successful invention stirred up other desires. Thus has man gone on increasing his desires, and there seems no limit to the development of these desires nor to the possibilities of satisfying them.

Because of these increasing wants it has become impossible for any individual or any community to be absolutely independent of his fellows.

The part that any individual does in the total work necessary to satisfy all his wants is exceedingly small. For example, a man may be employed making a very small part of an automobile. The part he produces is of little use to him, and the chances are that it would be useless to the grocer from whom he receives his supplies. What has the worker to do then in order to obtain groceries, shoes, and clothes? Since he cannot trade the part he makes, it becomes necessary for someone to trade the whole automobile and for the proceeds to be divided in such a way that each worker will get enough money to pay for the articles he actually wants.

It should be quite obvious that if the man who made the article had to stop work for the purpose of finding a purchaser and then making delivery, there would be much time lost and a great deal would be added to the cost of the article. Because of this fact trading or exchanging has become a very distinct branch of modern industry. By means of it automobiles, furniture, and other goods in which the work of many men is involved are transferred to such places, at such times, and in such quantities as are most convenient.

This distribution involves labor, and therefore adds to the cost of the article. On the other hand, it is a desirable procedure from the standpoint of the consumer because it insures the goods being at a convenient store or market, at the time they will be needed, and in quantities necessary to meet all the demands for them. In other words, by means of this agency, the man who produces the article and the individual who wishes to buy it are brought together.

In general, the people who perform this service for the man who produces the article and for those who want it are called *merchants.*

In the commerce of every community, whether it be village, city, state, or country, there are always articles going out and articles coming in. The articles going out are those which the people of the community have made, those coming in are those the people want.

In a very small community the retail merchant usually collects in small quantities those articles which have been made but which cannot be used in the community, and starts them on their way to the consumer; in exchange for these he provides the members of his community with such foreign products as they want.

In the larger communities we have the retail grocer, the retail meat market, and the retail fruit store. These retailers cannot afford to store up enough goods to insure a constant supply for their customers. Their business is small; they have not the money to buy big stocks; and they have no storage facilities in which to keep them even if they could do so. As many of the articles they sell have to be transported over thousands of miles of land and water it would be necessary for them to place their orders six or eight weeks in advance of the demand if they wished to buy directly from the producer and have the articles delivered just when his customers asked for them. From this it may be seen that it is almost as difficult for a small merchant to buy directly from the producer as it is for the individual customer to do so.

As the population increases and as the number of small retailers increases the demands become greater and another agent comes into the business of exchanging goods. As you have walked around the business district of your town have you ever noticed the commission houses, or the wholesale houses? These houses are owned by men who have become known as *middlemen, commission agents,* or *jobbers.* Now many people believe that these middlemen are unnecessary and that the cost of their services and warehouses could easily be saved if the retail man would only buy directly from the producer. This is true to some extent and is actually done in many cases in regard to articles which are produced and consumed in the same locality, but what is to be done in regard to such things as rubber, coffee, tea, and rice which have to be brought from distant countries?

The wholesale dealer orders the articles in large quantities, making the packing and shipping more simple and less expensive. When his large order arrives in his warehouse he divides the articles into small packages and sells them in such quantities as the retailer needs. Thus the small dealer is assured the articles he wants in the quantity he needs them, and at the time his customer demands them.

Not only are these middlemen a benefit to the small dealer but they are a great aid to the producer also. Those of you who have traveled in the train may have seen at certain stations along the line, yellow wooden sheds with a picture of a green pickle painted on them. These sheds are located at points which may be reached easily by the farmers, and are used as depots for collecting the tomatoes, onions, cucumbers, and other produce which has been raised in the communities in which they are located. The produce is then shipped into a central warehouse where it is turned into Heinz's pickles, soups, sauces, etc., and is then sold to the retailer in small quantities as he needs it.

Thus the wholesaler accommodates the farmer by providing a market close to his farm, and at a time convenient to him; he stores the product until it is needed; he changes its form into one in which it will not spoil; and he distributes it to the retailer in such quantities as the customer demands.

There are other agencies used in the business of aiding the producer to dispose of his product, and in aiding the members of the community to obtain the things they want when they want them, but those mentioned should be sufficient to indicate that:

1. Articles may frequently be otained profitably by the consumer from the producer when the source of the product and the market are close together.
2. When the supply exceeds the local demand a market removed from the source of the product must be found.
3. Every locality has to depend on other localities for some articles. These must be paid for with other goods which those desiring the articles do not need.
4. The transfer of these goods from one locality to another can be done more efficiently and more economically by a central agency.
5. It is cheaper to ship a carload of oranges from California to New York than it would be to fill individually the orders of the many small fruit dealers who want them for their customers.
6. Few, if any, of these fruit dealers could afford to buy and store a carload of oranges. They must buy in small quantities in a market which is close at hand and which can be reached conveniently at frequent intervals.
7. It is more economical for the farmer to sell his milk and have it collected each morning by a wholesale milk dealer than it would be for him to attempt to sell it in the city.

8. The middleman, wholesaler, and jobber are of great assistance in carrying on the business of a community.

Questions for Discussion

1. Do you know where the commission houses are in your city?
2. Do you know of any wholesale houses in your city?
3. What are commission houses and wholesales houses for?
4. Could we get along just as well if these houses were closed and we bought our goods direct from the producer?
5. Have you ever thought of how the Greek fruit and vegetable dealer in your street manages to have a fresh stock of vegetables every morning? Where does he get his supply?
6. How does the same dealer manage to obtain a steady supply of fresh oranges, bananas, pineapples, and other fruits which must be obtained from parts of the world far removed from the community in which his store is located?
7. Some farmers truck some of their produce into our public markets and sell directly to the public. Can he do this with his large crops of beans, potatoes, wheat, or beets?
8. Do you know how the milk you use is obtained by the grocer from whom you purchase it?

Freedom in the Drafting Class

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A discussion as to the proper amount of freedom to be permitted students in the school drafting room.

The question of individual freedom in the drafting class, that is, the freedom of the pupils to mingle with one another and move about as they wish, or to get into groups to chat, has not been much discussed.

In a recent visit to a mechanical-drawing class, the writer noted that not much work seemed to be going on, the atmosphere was quite social and friendly, but not at all businesslike. The teacher explained with some show of feeling and enthusiasm that repression was wrong, and that modern tendencies favored more freedom. He also added some remarks about the development of the individual along his natural bent, and the evil effects of trying to mold all of them into a common form. This explanation seemed a defensive reaction to unconsciously raised eyebrows at the informality of the proceedings.

It is generally conceded that school should not be preparation for life, but that it should be life itself. If that is the case, a drafting class should be organized and conducted along lines similar to an industrial drafting office. No self-respecting firm would permit its draftsmen to gather into groups during working hours to exchange week-end experiences, rehash current events, discuss football, and the like, and, therefore, no well-conducted drafting class should tolerate such practices.

The writer has experimented along the subject of personal freedom in his drafting classes, and has found that the work suffers in direct ratio as individual freedom is abused by pupils. He has also found that extreme stiffness and too much repression helped kill initiative. It is understood in his classes that a pupil may speak to his neighbor or for that matter to any other pupil in the room, providing that he does it so that no one else hears the conversation, and also providing that the interview is not prolonged beyond a minute or two. In a well-organized drafting room, a draftsman may speak to whomsoever he chooses, but it is understood that the conversation relates to the work, and that the interests of the firm are thereby being advanced.

Too much traveling around in the classroom is bound to result in shopping for information and copying, both decidedly injurious to the pupil. Lazy habits are easily established if the pupil can get the proverbial George to supply the information that he ought to dig out for himself.

The only way the teacher can judge of the strength or weakness of his pupils, is by doing *all* the helping and correcting himself. His training and experience have fitted him to aid the pupil without injury. On the other hand, bungling assistance from fellow pupils merely results in supplying the weak ones with additional mental crutches.

In any case, it is safer to have too little freedom than too much, if the work of the drafting class is to be carried on effectively. However, both extremes are undesirable.

Goals for Industrial-Arts Teachers

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A few questions which each industrial-arts teacher can ask himself.

1. Books and Reference Material

Are you making any effort to get reference material for your department from the library department?

Have you turned in any suggestions to your supervisor as to what books you need?

Are you requiring reference reading as an integral part of your course?

Get yourself and your department up to date by doing something about these questions.

2. Dead Stock on Your Shelves

Your success as a business executive is measured partially by your managing ability. To have unused materials on the shelves year after year, is a sign of poor management. Although you may have inherited some of the materials now on hand, it is your responsibility to devise ways of using this dead stock as soon as possible.

3. Why Are Some Elective Shop Courses More Popular Than Others?

My observation is that in most cases it is not the subject that governs the popularity. The teacher who knows his field thoroughly and who truly reaches into the hearts and minds of the greatest number of boys has no trouble in filling elective classes.

4. Have You Made a Personal Analysis of Yourself?

If your advanced courses are not in demand, *then you have not sold yourself to the beginning classes.* When advanced students and those who have left your school remark to other shop teachers the fact that they wasted their time by taking your advanced course or that these same students are able to do a better piece of work than the teacher himself, there is something seriously wrong with you.

5. Are You Conscious That Your Shop Is a Laboratory for Character Education?

What are you going to do about

a) Discovering abilities, aptitudes, peculiar personal traits; leadership abilities?

b) Developing organization ability; order and systematic procedure; power of visualization; initiative; accuracy of thought and expression; self-reliance; judgment, patience, and perseverance; neatness, accuracy, and skill; artistic and industrial appreciation; pride in accomplishment; spirit of co-operation and punctuality; courtesy, service, and consideration of others?

6. What Are You Telling Your Students Individually After You Discover or Develop Any of the Foregoing Points?

What you do about this point will frequently determine the answer to No. 3.

7. What Are You Doing to Keep Your Course of Study Up to Date?

Some shop teachers get out some very interesting supplementary teaching material in mimeograph form.

Information sheets, tests, and reference assignment sheets must be developed. *Will you be the first or the last to make a start along these lines?*

8. In What Specific Ways Are You Correlating Your Work With the Whole School Program?

If you do not know the correct principles of design and color, why not consult the art teacher. Why not have some of your projects designed and finished by that department? *You can learn by examples when you do not have time to take a complete course in color and design.*

If your boys do not like English, why not ask the English teacher to accept themes on shop topics. Give the boys credit for reading, writing, or reporting on such topics in their English classes.

Why not furnish the mathematics teachers with a list of shop mathematic problems commonly found in your work. Probably the boys would like work in mathematics if they could see a definite and tangible application of each problem.

How about looking over the science books and outlines to find ways that your department can better fit in. What principles and examples of general science are found in your shop that can be referred to the science teachers for lesson materials?

What about health and safety in the shop in relation to the regular health program in the school?

Why not urge the social-center teachers who are responsible for guidance and character programs to visit the shops when seeking illustrations of certain character points? Where is there a better place in your school to secure functional information on trades, occupations, and skills on a level which can be understood by the students in the shops?

Have you ever thought of writing an industrial-arts play with your boys as characters and all equipment furnished by the shop? Such plays may be given before the whole school in co-operation with the auditorium teacher. An excellent example of such a play is on file in my office. It was written and produced by one of our industrial-arts teachers last year.

Why not exchange your course of study outlines with other departments? Your organization charts, regulations, grading system, and other teaching aids might be more valuable if other teachers could see them.

The foregoing list of eight major objectives for greater service issues a challenge to every industrial-arts teacher.

Testing and Tests

An Industrial-Arts Examination

O. E. Monninger

Miami, Florida

In recent months, a number of true-false and completion tests have been recommended for use in industrial-arts work.

The guessing psychology of these tests, as well as the elimination of practically all responsibility of expression, which a student should carry, decrease the effectiveness of these tests. In industrial-arts work, the student should develop the responsibility of expressing himself in the language of the shop, and should be able to make sketches and do certain layout work. Many junior-high-school students taking shopwork, do not have the opportunity to take drawing or geometry, and even if they do, the practical application of sketching and layout work is rightly a function of the industrial-arts shop.

Included herewith is a copy of a general test used in the industrial-arts classes of the Wm. Jennings Bryan Junior High School in North Miami, Fla. This test has been worked out to cover fundamental matters pertaining to woodworking only. No machine-work questions are included, as few junior-high-school students in our schools, are permitted to operate machines.

This test is posted together with answers and a chart showing layouts, so the student has ample opportunity to acquaint himself with the *correct* answers. The student is thus impressed with the correct answers and avoids the confusion left after guessing answers, perhaps wrongly, and the subsequent haziness which future recall may bring forth.

There are no secrets in what we wish the student to know, and if he applies himself in the study of the test questions and answers, he can very easily pass any test given. Tests usually consist of ten or twelve questions selected from the general test, of which each student is furnished a copy. The student's answers are given on a separate sheet. Different dimensions may be used where the blank spaces appear. The note at the top of the test shows the questions for which the various grades are held responsible, and as the student progresses from grade to grade he is impressed more deeply with the correct answers, so that when he has finished the course these fundamental matters have been easily acquired.

Industrial-Arts Examination

NOTE:

Grades 7-B & 7-A will be asked questions from 1 to 44 inclusive.

Grades 8-B & 8-A will be asked questions from 1 to 50 inclusive.

Grade 9-B will be asked questions from 1 to 56 inclusive.

Grade 9-A will be asked questions from 1 to 60 inclusive.

Use a separate sheet of paper for your answers. The instructor will tell you which questions to answer.

1. Draw a small diagram of the teeth of a crosscut saw. Give angle.
2. Draw a small diagram of the teeth of a ripsaw. Give angle.
3. Make a freehand sketch of a back saw.
4. Make a freehand sketch of a coping saw.
5. Make a freehand sketch of a compass saw.
6. Make a freehand sketch of a marking gauge.
7. Make a freehand sketch of a brace.
8. Make a freehand sketch of a hand drill.
9. Make a freehand sketch of an auger bit, also a drill.
10. Make a freehand sketch of a nail set.
11. Make a freehand sketch of a countersink.
12. Make a freehand sketch of a putty knife.
13. Make a freehand sketch of a sloyd knife.
14. Make a freehand sketch of a rasp.
15. Make a freehand sketch of a spokeshave.

16. Explain the *set* of a saw. Why does a saw need to be set?
17. Describe a block plane. (Give length, width, and type cutting iron.)
18. Describe a smooth plane. (Give length, width, and type cutting iron.)
19. Describe a jack plane. (Give length, width, and type cutting iron.)
20. Describe a jointer plane. (Give length, width, and type cutting iron.)
21. Name the principal parts of a jack plane.
22. How is a cutting edge whetted?
23. Name the two main woodworking squares.
24. What is the adjustable square for laying out angles called?
25. How are auger bits numbered?
26. How would you check the size of an auger bit?
27. What is an expansive bit?
28. How do you bore a hole properly after locating its center?
29. Name four kinds of nails.
30. How would you specify nails when ordering?
31. How would you specify wood screws when ordering?
32. A mechanical drawing is a scale drawing showing what?
33. Give order of finishing surfaces in squaring a piece of stock.
34. What is a dado cut? A rabbet? A chamfer?
35. How far from the edge is the center line of stock ..... in. wide?
36. How would you set your gauge to draw a center line on stock ..... in. thick?
37. If you cut ..... in. pieces off each side of a piece of stock ..... in. wide and cut the remaining piece in half, how wide would each of these last pieces be, not deducting for the saw kerf?
38. Explain the grading of sandpaper.
39. When is steel wool used in finishing?
40. Name three stains having different solvents.
41. Name three different kinds of finishes that may be applied on wood.
42. May shellac and oil brushes be interchanged? Why?
43. May paint be applied over stain if desired?
44. By what unit of measurement is lumber sold? Describe this unit.
45. How would you lay out a 45-deg. angle?
46. What is a dowel?
47. How should hide furniture glue be when used?
48. How should the hand screw be clamped when in use?
49. In what order are dimensions for lumber given?
50. What is the commonly accepted difference between hardwood and softwood trees?
51. Show two views in projection of a mortise or a tenon and name it.
52. Define counterbore, stop chamfer.
53. Explain diagonal squaring method for gluing rails and legs of a table.
54. What kinds of wood need to be filled in finishing?
55. How is pumice stone or rottenstone used?
56. Explain the method of applying a French polish.
57. Show graphical method of passing a curve of ..... in. radius through any two given points.
58. Show graphical method of passing a circular curve through any three given points.
59. Show graphical method of bisecting a given angle. A given line.
60. Lay out a ..... deg. angle with a compass.

WOOD-FINISHING EXAMINATION

Herbert K. Iverson, Lincoln High School, Seattle, Washington

Part II. Completion

Directions: In each blank space in the sentence write in the word that will make the sentence correct and complete, and then place the word in the space provided for it at the left of the sentence. The first statement is answered correctly.

beauty 1. Water stains are the best stains for bringing out the natural *beauty* of the wood.
..... 2. It is best to dissolve water-stain powder in ..... water.
..... 3. Water stain will ..... the grain of the wood.
..... 4. A water-stained surface must be lightly ..... after the stain has thoroughly dried.
..... 5. Water stains are aniline dyes bought in ..... form.
..... 6. Dip the brush into the stain about ..... of the length of the brustles.
..... 7. "Four-pound cut" shellac is too ..... for most purposes.
..... 8. Spirit stains are at present used mainly for ..... repairwork.
..... 9. Oil stains dry by ..... and therefore take longer to dry than lacquer.
.....10. Natural shellac is called ..... shellac and after a process of refinement it is called ..... shellac.
.....11. Shellac is often used as a ..... filler on close-grained woods.
.....12. A paste filler should be used on an open-grain wood such as .....
.....13. ..... and ..... are frequently done in one operation by applying filler thinned with the proper stain.
.....14. Filler is not to be used as a putty to fill ..... or .....
.....15. Spar varnish has a greater proportion of ..... than does cabinet rubbing varnish.
.....16. The name *spar* comes from its being used to finish the ..... and other outside parts of .....
.....17. For general use ..... as well as ..... there is no varnish that is as lasting as spar varnish.
.....18. Lacquer cannot be used over any ..... finish unless a sealing coat of shellac has been first applied.
.....19. Lacquer was known to the ..... long before this country was discovered.
.....20. Lacquer dries entirely by ..... within a few hours.
.....21. The material that gives body to varnish is called .....
.....22. Oil stain is usually purchased in ..... form.
.....23. A brush used in oil stain should be cleaned in .....
.....24. Shellac is made by dissolving shellac flakes in .....
.....25. Filler dries by a process known as .....
.....26. The material that is basic in the manufacture of lacquer is called .....
.....27. Rottenstone is a polishing agent made from ..... rock.

TRUE-FALSE TEST

Fred W. Weyer, Los Angeles, California

Questions based on Hjorth's *Principles of Woodworking**

The true and false questions listed below will be answered by placing the letter *T* to indicate *true* or the letter *F* to indicate *false* at the right-hand side of the sheet in the space provided for same.

Example: Some workbenches are built with drawers in the bottom section. T

1. A workbench top is made of narrow strips to insure freedom from warping and to permit of thick heavy construction. .....
2. A quick-acting vise has a dog to aid in the rapid manipulation of the vise. .....
3. Try squares are used to frame a building with. .....
4. Angles other than 45 deg. are usually laid out with a T bevel. .....
5. The cabinetmaker should use a steel square when gluing up a face frame. .....
6. The brace measure and octagon table are marked on the blade of the steel square. .....
7. A board 12 ft. long by 1 in. thick contains as many board feet as it is inches wide. .....
8. The rafter table is stamped on the blade of the square. .....
9. The run of a rafter is one quarter the width of a building. .....
10. A run of 12 ft. and a rise of 6 ft. will make a ¼-pitch roof. .....

(Continued on page 161)

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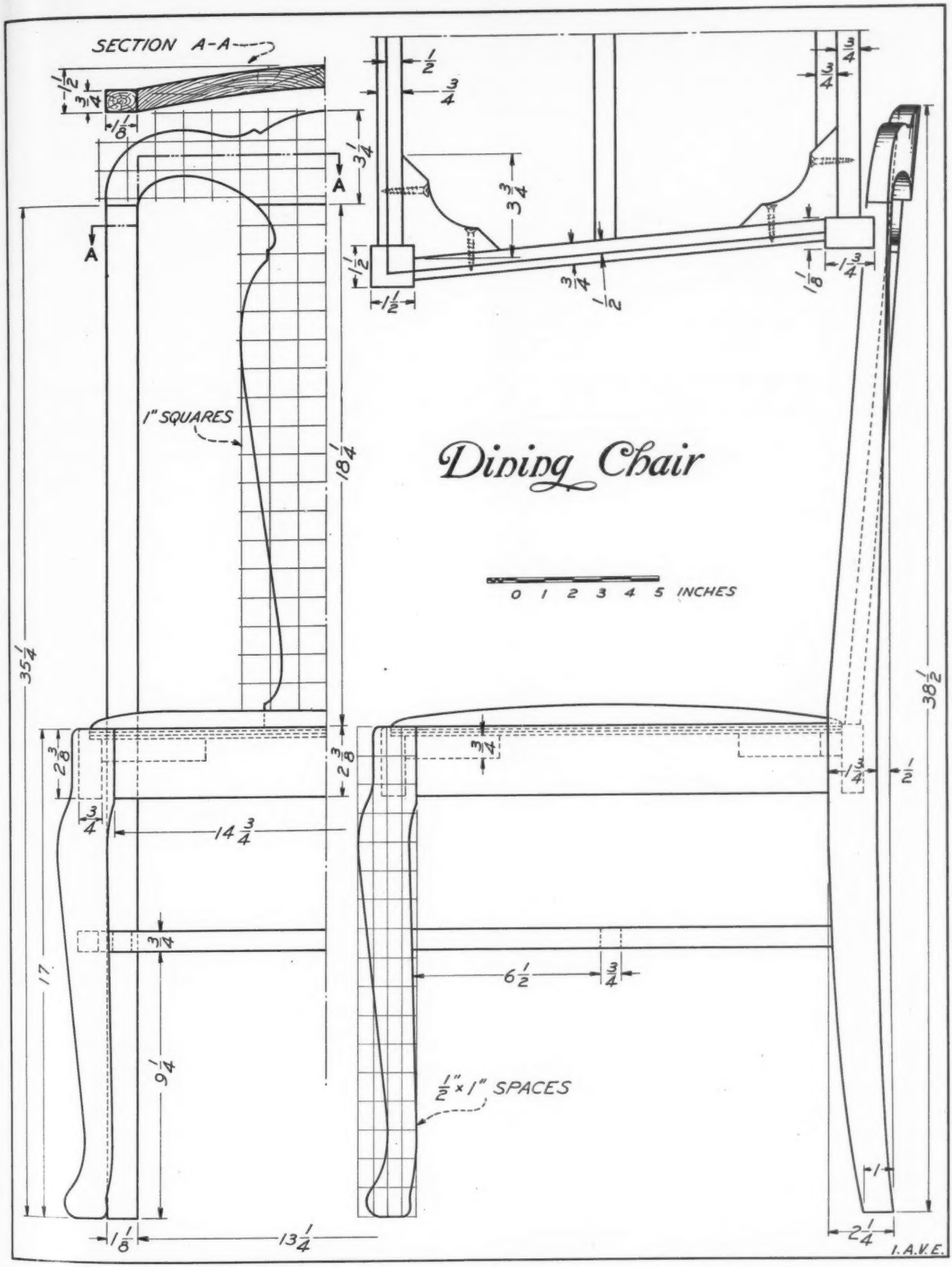


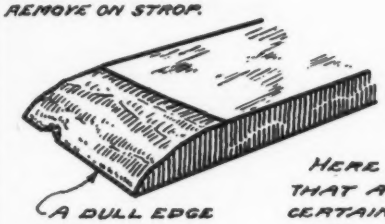
Submitted by James Chadek, Woodworking Department, Appleton Vocational School, Appleton, Wisconsin

SHARPENING A CUTTER

Elementary Woodwork.

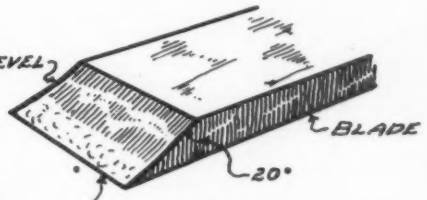
OPERATION SHEET

-N-
THE WIRE EDGE MAGNIFIED. REMOVE ON STROP.



A DULL EDGE FOR A DULL BOY.
-A-

HERE WE HAVE TWO CHISELS THAT ARE ABLE TO PERFORM A CERTAIN AMOUNT OF USEFUL WORK BUT IN DIFFERING DEGREES. THE ONE ON THE LEFT IS AS INEFFICIENT AS THE OX-CART. THE KEEN CHISEL ON THE RIGHT IS USED BY THE ALERT BOY.



-B-

NO JOB IS HALF AS HARD AS THE DREAD OF IT.

THE LESSON- THE CUTTING EDGE SHAPES CRUDE MATTER, EVEN AS A KEEN MIND CLEAVES THRU TO ESSENTIAL TRUTHS, CUTTING AWAY THE WASTE AND USELESS MATERIAL. AS LONG AS MAN'S BEST CUTTING EDGE WAS LIKE THE ONE SHOWN AT -A-, MODERN CIVILIZATION WAS IMPOSSIBLE. NOT ONLY DID THE STEAM BOAT, AUTOMOBILE AND AIRPLANE WAIT UPON THE CUTTING EDGE, BUT KREISLER WAS MADE POSSIBLE BY STRADIVARI'S KEEN TOOLS AND THE SCULPTOR IS ENABLED TO WORK TO HIS FINE LINES.

YOU ARE PART OF A GIANT PROGRAM, ENACTED THRUOUT THE AGES, WITH ALL MANKIND ON THE STAGE, HELPING TO MAKE A NEW AND BETTER WORLD. EVERY EFFORT YOU MAKE TO IMPROVE YOUR TOOLS IS A DEFINITE STEP FORGED IN THE MARCH OF PROGRESS. "LIFE IS REAL, LIFE IS EARNEST", IS ONE OF THE TRUEST STATEMENTS EVER MADE.

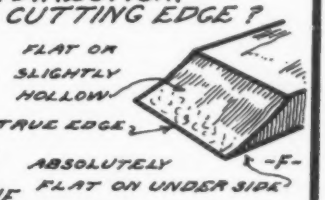
DIRECTIONS- TO FORM A CUTTING EDGE CORRECTLY, YOU MUST UNDERSTAND THE FOLLOWING POINTS:-

1- THE PECULIAR QUALITY OF STEEL KNOWN AS "TEMPER." THE STEEL OF YOUR CHISEL OR PLANE CUTTER IS MADE HARDER BY THE PROPER TREATMENT WITH HEAT. THE WRONG APPLICATION OF HEAT WILL, HOWEVER, "BURN" OR SOFTEN THE STEEL. AS YOU GRIND, COOL THE TOOL IN WATER FREQUENTLY.

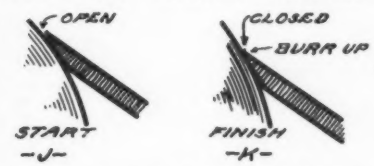
2- WHAT IS A WEDGE? A WEDGE IS FORMED BY TWO SLANTING SURFACES, SEE -D- AS THESE SURFACES ENTER THE WOOD, (SEE -E), IT SPLITS APART.

THE WEDGE FOLLOWS THE GRAIN. IT CANNOT CONTROL DIRECTION.

3- WHAT IS A CUTTING EDGE? IT IS FORMED BY THE TWO FLAT SLANTING SURFACES MEETING IN A CLEAN, FIRM EDGE. THIS KEEN EDGE CUTS THE MATERIAL AND THE BEVEL PUSHES IT AWAY.



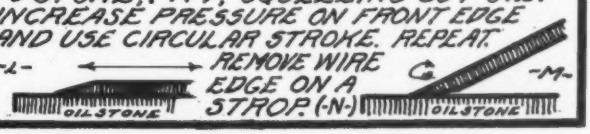
GRINDING:- THE CUTTER MUST BE HELD FIRMLY, EITHER BY HAND OR BY MEANS OF A REST, PROVIDED WITH A GUIDE.



CAREFULLY BRING THE CUTTER TO THE POSITION SHOWN AT -J-, WITH THE GRINDER TOUCHING THE MIDDLE OF THE CUTTER'S BEVEL. AS YOU GRIND, KEEP CUTTER MOVING FROM SIDE TO SIDE, IN ORDER TO FORM A TRUE EDGE.

COOL CUTTER FREQUENTLY. GRIND UNTIL IT CLINGS TO STONE, A BURR TURNS UP, (SEE -K-) AND SPARKS FLY DOWN CUTTER. SEE -H-. THE CUTTING EDGE SHOULD BE STRAIGHT AND SQUARE.

OILSTONING:- MOVE CUTTER BACK AND FORTH, WITH ITS FLAT SIDE HELD FIRMLY TO STONE. SEE -L- THIS BENDS BURR UP. NEXT PLACE BEVEL FLAT TO STONE, (-M-), SQUEEZING OUT OIL. INCREASE PRESSURE ON FRONT EDGE AND USE CIRCULAR STROKE. REPEAT.



Submitted by Clifford B. Smith, Buffalo, New York

(Continued from page 156)

11. A run of 18 ft. and a rise of 9 feet will make a ⅓-pitch roof. .....
12. A butt gauge is used to gauge for the width of the hinges. .....
13. Trammel points are used to describe geometric figures. .....
14. A 7-point saw is 7 in. wide at the heel. .....
15. The teeth of a crosscut saw are filed straight across the saw. .....
16. A dovetail saw has a handle like a chisel. .....
17. The foreplane and jointer are used for planing small pieces. .....
18. The block plane is used for planing end wood. .....
19. Molding planes have as many as 53 different cutters. .....
20. A plane gauge replaces the constant use of a bevel or try square in jointing the edge of a board. .....
21. The spokeshave and circular plane are used for similar purposes. .....
22. There are two general classes of chisels called *tang chisels* and *socket chisels*. .....
23. The framing chisel is always used for light work. .....
24. A brass or iron ring, called the *ferrule* fits on the lower end of a plane handle. .....
25. Most of the gouges and carving tools are made with a handle to receive a tang. .....
26. The threads of an auger bit are made in three different pitches: Steep, medium, and fine. .....
27. The lips of the auger bit score the circle to be bored. .....
28. The Forstner bit is used to bore endwood, thin pieces, and cut accurately. .....
29. The size of a claw hammer is indicated in pounds and ounces on the head. .....
30. Machine tools can perform the work of the cabinetmaker, but not as accurately and uniformly. .....
31. A swing cutoff saw operates to cut either from above or below. .....
32. The cutoff saw is allowed to run continuously in an up-to-date shop. .....
33. The advantage of the underswing cutoff saw is that the operators hands are left free. .....
34. Besides sawing operations, the circular saw can be used for edge planing, shaping, cutting grooves, rabbets and tenons, boring and mortising. .....
35. Both the rip- and crosscut saw can be used on the universal circular saw. .....
36. The speed of a circular-saw arbor should be 1500 r.p.m. when removing the saw. .....
37. The nuts which clamp a circular saw turn clockwise. .....
38. The fence on a saw protects the worker from injury. .....
39. In cutting short blocks an iron gauge block should be used to protect the operator by preventing binding of the saw. .....
40. The angle used for cutting segments of a circle can be obtained by proper use of the locating points on the saw table. .....
41. The miter saw has more teeth shaped like the ripsaw than the crosscut saw. .....
42. A grooving head may be fastened to the arbor with knives ground for edge planing or molding work. .....
43. A foolproof guard for safety has not been invented. .....
44. A heat buckled saw can be retempered in the shop with a blowtorch and water. .....
45. A spreader is used in crosscutting to prevent pinching the saw. .....
46. Standing to the left of the line of a saw may prevent injury. .....
47. It is sometimes necessary to use the saw without the guard. .....
48. The upper band-saw guide should be placed 4 inches above the work to give proper vision in operating. .....
49. The band-saw guide wheel is adjusted so that it just clears the back edge of the saw when not being used. .....
50. The teeth of the band saw should clear the edge of the guide jaws. .....
51. Band saws are operated at from 600 to 900 r.p.m. .....
52. Resawing on the band saw should first be kerfed on both edges with the circular saw. .....
53. The size of a jointer is given according to the length of its knives from 4 in. to 30 in. .....
54. When the rear or outfeed table of the jointer is too low, it will cause the cutter head to dig into the material. .....
55. Thin pieces to ⅛ in. thick can be planed on the jointer by holding them firmly to the cutting head with the fingers. .....
56. A single surfacer requires that a board be run on both faces S2S. .....
57. Jointers are equipped with sectional feed rolls. .....
58. A warped board should be run through the planer with the warped surface on the bed. .....
59. The speed of a planer head is from 3600 to 4000 r.p.m. .....
60. Pieces shorter than the distance between the feed and delivery rolls should not be run through the planer. .....
61. Overheating of the bit in a hollow chisel mortiser is caused by friction with the wood and improper adjustment. .....
62. The spindle speed of a shaper varies from 3600 to 7200 r.p.m. .....
63. Fluting, reeding, and shaping can be done with a portable router. .....
64. The belt sander table is moved crosswise to the direction of the belt for the purpose of doing accurate work on wide pieces. .....
65. Woodworking tools are best ground on the emery wheel traveling at 1800 r.p.m. .....
66. Most up-to-date power tools are run from a countershaft. .....
67. Machine cutters and hand tools are safer to work with if they are sharp. .....
68. A good job can be done with dull tools if the worker is skillful. .....
69. A hand saw is set to give clearance for the blade. .....
70. Crosscut saws are filed from both sides toward the toe to form a knifelike edge. .....
71. Drawing the temper from tools is prevented by use of kerosene or water when grinding. .....
72. Whetting a blade is done with a circular motion at one end of the stone. .....
73. The back of the fingernail is a good place to test the sharpness of a tool. .....
74. A hand scraper is ground the same as a plane blade. .....
75. Drawfiling is done by grasping the file at both ends and the motion is longitudinally back and forth over the edge. .....
76. The burrs on scrapers are removed with the burnisher. .....
77. The burnisher will sharpen a scraper several times after it has been used. .....
78. The lips on an auger bit are filed on the upper side only. .....
79. The outside corners of a turning gouge are ground to a true angle. .....
80. The circular saw is jointed by passing a soft emery stone over the saw after lowering the saw in the table. .....
81. The ripsaw teeth in a circular miter saw are ground 1/16 in. higher than the crosscut teeth. .....
82. Side filing a circular saw refers to lining up the teeth to project equally over the side. .....
83. A scarfed joint in a band saw is likely to be stronger than a butt joint. .....
84. Planer knives can be sharpened without removing them from the head. .....
85. A narrow board that is to be surfaced to dimensions is best marked with a marking gauge from the working face and the working edge. .....
86. A narrow board that is to be end planed is prevented from splitting by placing a piece of wood behind the edge while planing. .....
87. Two boards to be jointed for gluing are edge planed both at the same time. .....

88. A surface that has been crossplaned true over all is finished by planing from end to end. .....
89. Boards to be glued up for width are surfaced on the faces before gluing. .....
90. Table legs can be tapered on the circular saw by use of a notched jig. .....
91. Material that is in "wind" cannot be used and is usually thrown in the scrap pile. .....
92. The spur of a rabbet plane is used to score the face of a board to be rabbeted. .....
93. The depth of a dado joint should be about two thirds the thickness of the board.
94. A gained joint is the same as a blind dado. .....
95. A dado joint and a grooved joint differ by running against and with the grain. .....
96. A barefaced tongue joint is a single rabbeted joint set in a groove. .....
97. Grooves, dadoes, and rabbets are usually cut on the circular saw, shaper, or router. .....
98. A dado head is used in preference to a router or circular saw for through dadoes.
99. A cabinet scraper is used to finish cross-grained or curly wood. .....
100. A gained joint is used to fasten shelves into open-faced cabinet ends. .....

Key

1. T	3. F	5. T	7. T	9. F	11. F	13. T	31. T	49. T	67. T	85. T
2. F	4. T	6. F	8. T	10. T	12. T	14. F	32. F	50. T	68. F	86. T
						15. F	33. T	51. T	69. T	87. T
						16. T	34. T	52. T	70. T	88. T
						17. F	35. T	53. T	71. T	89. F
						18. T	36. F	54. T	72. F	90. T
						19. F	37. T	55. F	73. T	91. F
						20. T	38. F	56. T	74. F	92. T
						21. T	39. T	57. F	75. T	93. F
						22. T	40. T	58. F	76. T	94. T
						23. F	41. F	59. T	77. T	95. T
						24. F	42. T	60. T	78. T	96. T
						25. T	43. T	61. T	79. F	97. T
						26. T	44. F	62. T	80. T	98. T
						27. F	45. F	63. T	81. F	99. T
						28. T	46. T	64. T	82. T	100. T
						29. T	47. T	65. F	83. T	
						30. F	48. F	66. F	84. T	

Problems and Projects

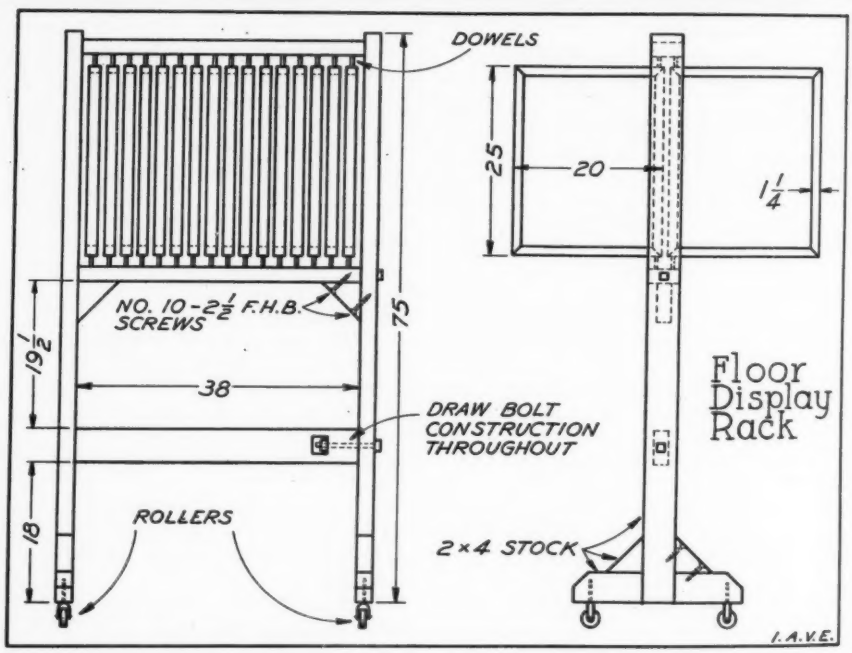
PORTABLE DISPLAY RACK

H. Groneman, East Texas State Teachers College, Commerce, Texas

The industrial-arts teacher usually has more drawings and informational, educational, and instructional charts than the wall space of the average shoproom will take care of. The device illustrated herewith affords an opportunity to have these charts easily accessible at all times with a minimum of time wasted. The chief virtue of this particular rack is that it will accommodate a maximum of 64 full-size teaching aids. Another one of its desirable qualities is that it may be moved to any part of the shop or laboratory. When not in use, this display may be compactly closed and wheeled back to its allotted space.

Portable display rack

The illustrations show the general arrangement of all parts. The building of this device is so flexible that it may be put together to suit any teacher's requirements. The simplicity of construction is an admirable feature. A display rack of this type is a worthwhile piece of auxiliary equipment for any school shop.



THE TWO-HEDDLE TABLE LOOM

R. H. Jenkins, Humboldt State Teachers College, Arcata, California

After the box loom and the roller box loom, the next development is the two-heddle loom, and as looms have a long ancestry, there are many designs to which we might turn. The aim in view at this point is to furnish a design for a loom which will be practical, compact, inexpensive, and easy to construct.

The box-roller type of loom which was described on page 403 of the November, 1938, issue of this magazine forms an easy base from which to advance to this next stage of loom construction. The rollers and ends can be made the same. The sides, however, should be longer and slightly wider. Two pieces ¾ by 4 by 48 in. make a convenient size. The ends can be made from solid boards or with strips cut and joined together. The width of the loom will depend entirely on the kind of weaving to be done. For scarfs and table runners, a loom sixteen inches wide is quite satisfactory and costs proportionately less than the wider ones. It also takes up just so much less space. For rugs, carpets, curtains, and dress goods, a much greater width would have to be considered. Twenty-seven inches is as wide as will easily go through all ordinary 30-in. doors, so that for widths, many items have to be taken into consideration when building a loom.

Since there are now two sets of heddles to be added, provision must be made for some means of support to hold them in position. For this purpose two pieces ¾ by 4 by 25 in. will do nicely. These two pieces should be joined to the sidepieces of the loom at or near the center point. These upright pieces

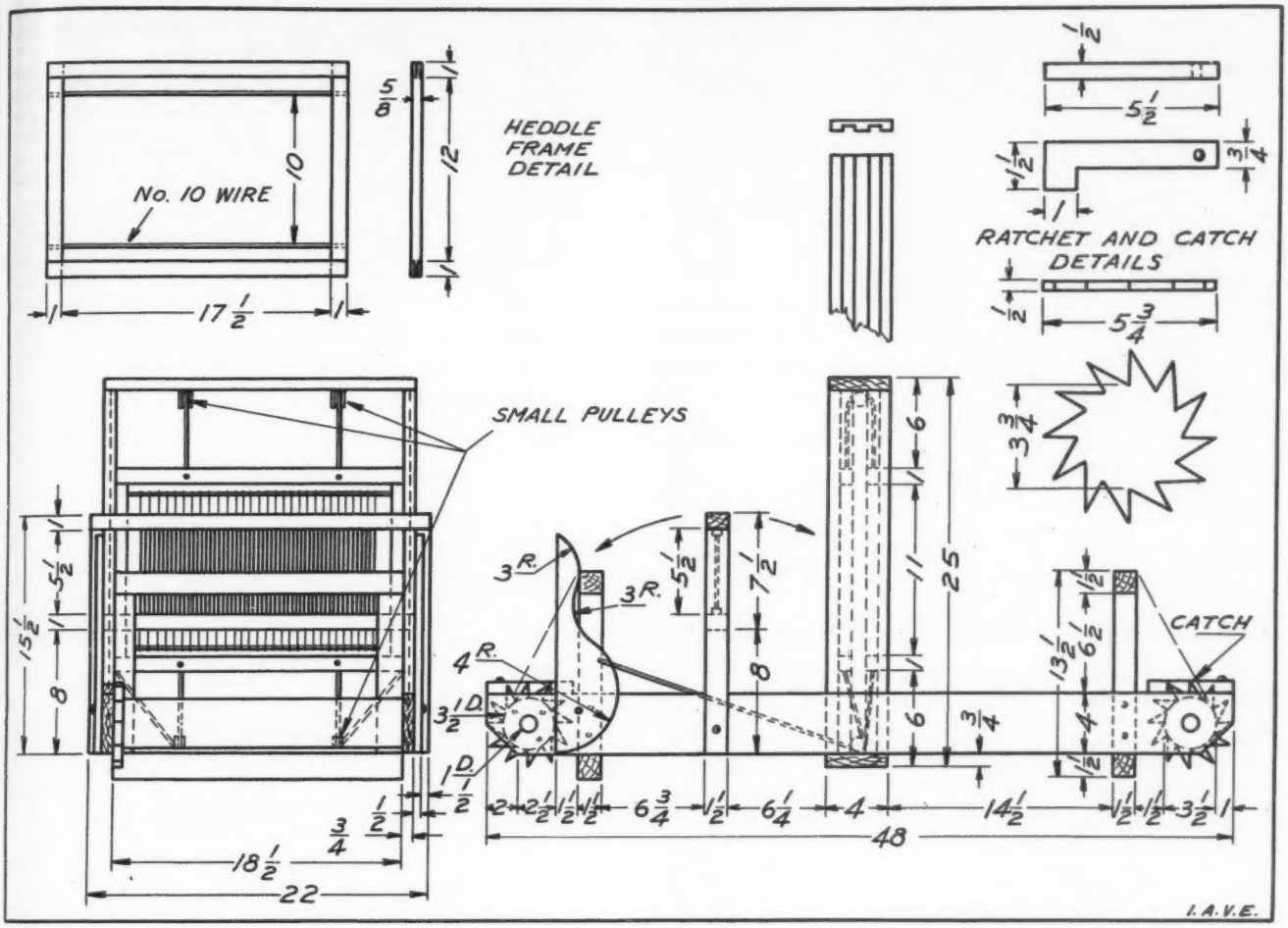


Fig. 1. This is a most satisfactory loom for weaving scarfs, table runners, handbags, napkins, etc. Burlap is tacked to the rollers to save yarn which otherwise would be wasted. Strong cord is used for the lever action, and the pulleys are of the very small type obtained from the variety store. Any type of joinery can be used which will suit the ability of the workman

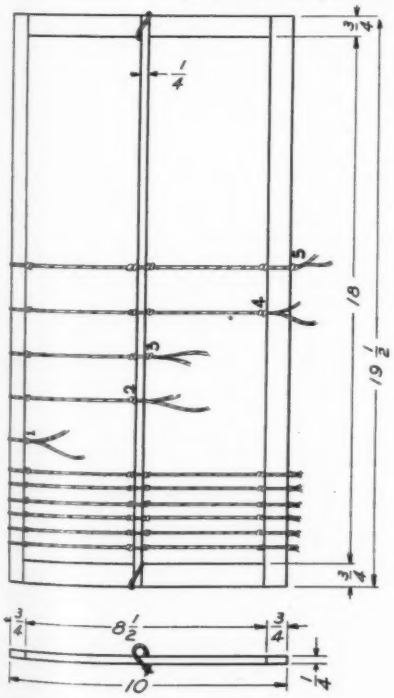


Fig. 2. Jig for tying heddles.

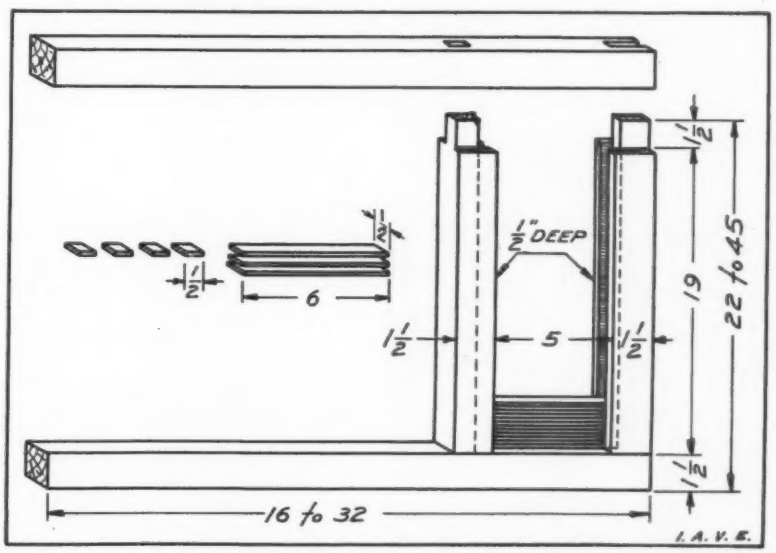


Fig. 4. The writer strongly recommends the buying of the beaters or reeds for looms. However, they can be made as shown. Cut the strips from hardwood and sandpaper very smooth. Make each strip as thin as possible, if they can be kept strong. Rabbet out a place for the ends, and lay the strips in position with a small piece as a spacer between each strip. When ready for the final assemblying, glue the strips as they are put in place. With care, eight or ten dents to the inch can be made. The main problem is to make the work smooth enough so as not to wear the warp when the reed is put to use

may be nailed on the outside, or fastened on with a half-lap joint, glued to make a neater job; but the fastening will do with nails. Across the top and again at the bottom, two more pieces are needed. They are ¾ by 4 by 20 in., for the 16 in. width of loom, and are for the support of the pulleys which operate the heddles.

Heddles come in 10 and 12 in. lengths, so that the frames that hold them must be large enough to take a length of that size, and still give room to move the heddles about easily. With a 10-in. heddle, the frame should measure 14 in. in width, and, of course, as long as the inside measure of the loom, which in the present case is 19½ in. These frames do not have to be heavy, but should be fairly strong. Pieces ⅝ by 1 by 14 in. and ⅝ by 1 by 19½ in. are large enough for the purpose. For directions on making string and wire heddles, see Figures 2 and 3.

The heddles may be strung on pieces of the No. 10 gauge wire. Set in small holes drilled in the frame. The frames are hung on strong cord, the latter passing through small pulleys of the 5-and-10-cent-store variety. The pulleys are fastened to the top boards as shown in Figure 1. At the bottom, the heddle frames work on separate pulleys with strong cords which are operated by levers on the side of the loom.

The heddle frames will operate in their supports without further guides; however, guides may be rabbeted out as shown in Figure 1, or four pieces ½ by ½ by 24 in. may be fastened with small brads on the inside of the uprights. These guides keep the heddles in place. They will move smoothly up and down with little friction, and there will be no swinging out of place.

The Roller Action

The students in the author's classes prefer the lever type of heddle movement to any other action that is in common use on table models. However, the roller design should be mentioned because it is practical and easily made.

All that is necessary for the roller movement is to replace the 20-in. board on the top of the frame with a roller 3 by 18½ in., and run over the top of this roller a short belt with the ends fastened to the heddle frames. A tack driven through the belt into the roller keeps the belt from slipping, and a peg fitted in a hole in the roller acts as a lever to work the machine. The lower tension of the heddles is governed by a cord, fastened to each frame and run through the small pulleys. The process is efficient and is satisfactory except for short people who find it hard to reach the roller.

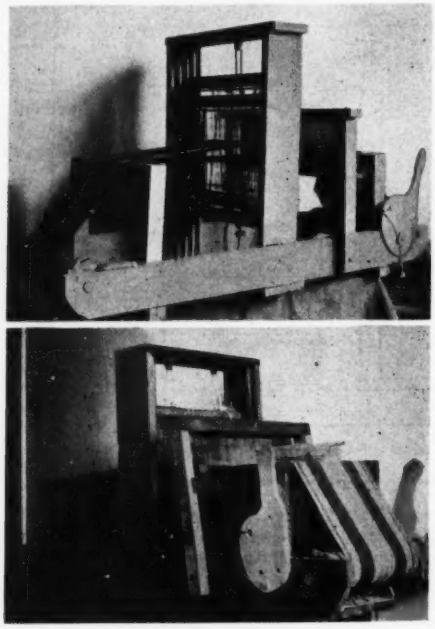


Fig. 5. Table-model loom

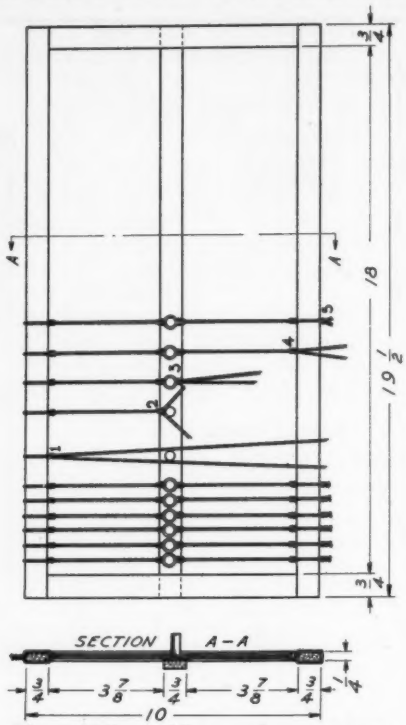


Fig. 3. Wire heddles are in many ways more satisfactory than string-tied ones, and this frame makes possible the twisting of one's own. In this case, the same as with the string, the frame should be made to fit the loom for which the heddles are intended. The strip in the middle should be fastened with screws so as to be removed when the heddles are finished. The pin, around which the eye of the heddle is made, should be removable so as to be drawn out as each heddle is twisted. Fine wire is used for the heddles, and the order of twisting is shown at 1, 2, 3, 4, 5. Any type of strong joint may be used in making the frame

The Reed or Beater

Thus far the discussion has had to do with the heddle action of a loom. Now we must take up another important part of the equipment — the reed or beater. The reed or beater is that part of the mechanism which beats the weft into position on the warp. A skillful worker can make a beater of wood, as shown in Figure 4, but it will not prove so very satisfactory. It is difficult to finish the wood as smoothly as metal, and to make a reed with many dents is practically out of the question. In fact, the time spent in the process of construction would make possible the earning of enough money to more than buy a factory-built product. It is the one piece that the writer strongly recommends buying. The heddles, too, are cheap, and much more satisfactory. However, anyone who wishes can easily tie his own heddles, and some prefer to do so.

A twelve- or fourteen-dents-per-inch reed makes a nice size with which to begin. These reeds are sold in stock lengths in which anything shorter costs just as much as the stock size. Thus, if short lengths like 15 or 16 in. are needed, it pays to buy standard lengths and then cut to the desired dimension.

A frame must be made to hold this reed, which is in the neighborhood of 5 in. wide. When in place, the center of the reed should come on a line with the tops of the ends of the looms. These ends are approximately 12 to 13 in. high, so that the side of the beater frame would have to be nearly 16 in. long. This would take then, two pieces 1 by 1½ by 16 in. for the sides, and one piece 1 by 1½ by 20 in. for the bottom and one piece 1 by 2 by 22 in. for the top. The top and bottom piece should be rabbeted out so as to hold the reed, or strips ½ by ½ by 20 in. may be tacked on each side of the reed to serve the same purpose.

The reed swings in its frame to the sides of the loom. It is fastened to each side with a single large screw which give opportunity for easy action. The location of the reed is approximately halfway between the heddle frame and one end of the loom, and, as has been mentioned before, at such a height that the center of the reed is on a line with the tops of the ends of the loom.

EIGHT-FOOT KAYAK

James McGregor, Pasadena, California

This 8-ft. kayak, with its symmetrical lines, has been popular mainly because of its low cost. Although it is a modified type, as it does not have the conventional bow, it provides many interesting problems for junior-high-school boys. Boys with younger brothers like this boat because the cockpit has room enough for an extra passenger.

Spruce has been used throughout for battens and frames. The wood should be selected for straight grain, strength, and proper moisture content. If the wood has been dried out too much by kiln drying, fractures and breakages are likely to occur. Soft and spongy boards are not suitable for battens. Such boards should be regleted to parts of the construction where less strength is required.

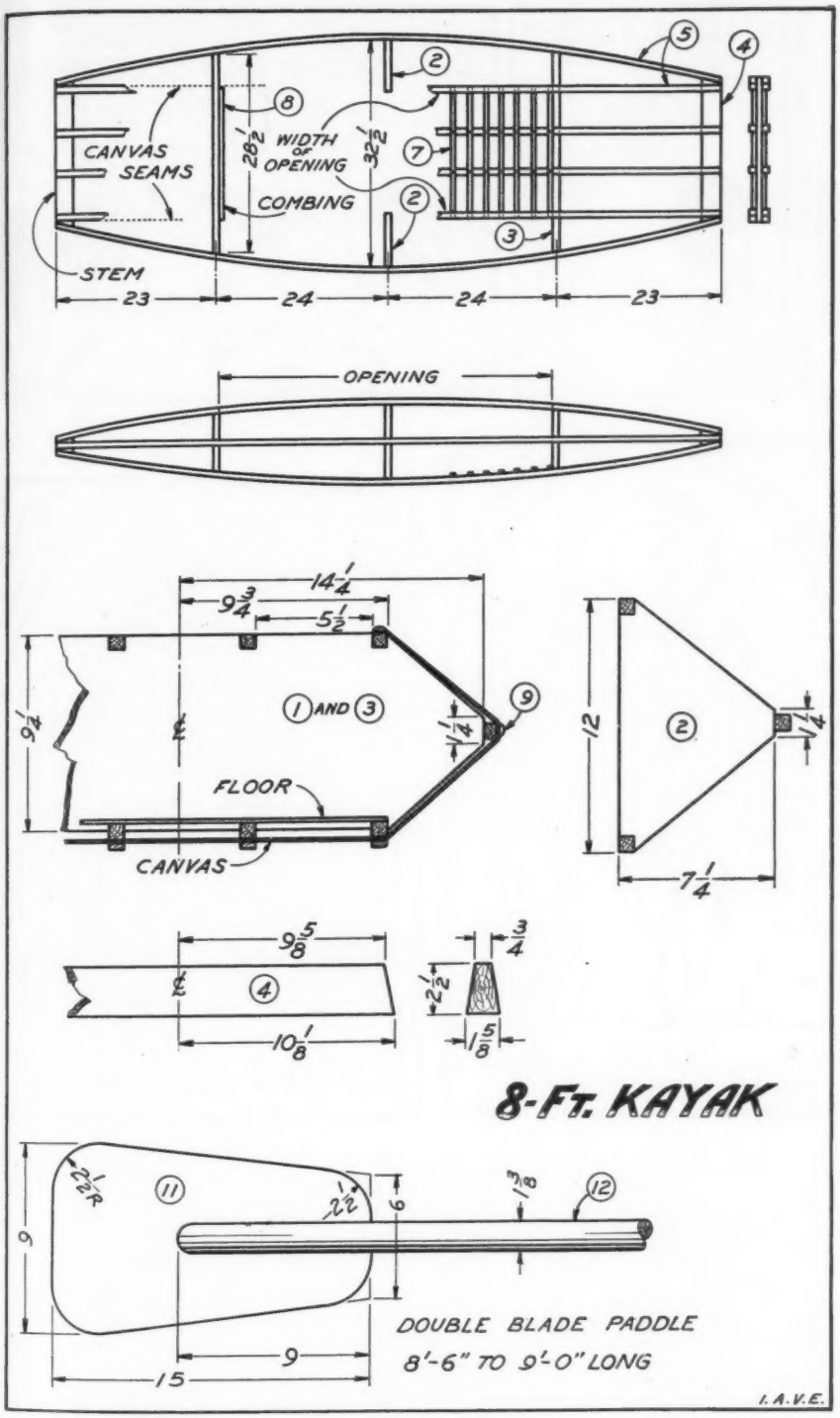
Construction

Make two of each of the frame No. 1, No. 2, and stem No. 4. Cut two of the ¾ by ¾-in. battens 8 ft. long. Assemble the two 8-ft. battens to the two No. 4 stems, using No. 8 by 1½-in. f.h. brass screws and spreading with a 32½-in. batten at the center.

The center line on the end of stem No. 4 should line up accurately with the center of the batten. Insert frames Nos. 1 and 3, beveling off the ends to fit snuggly against the battens, and fasten in place with a screw on each end. Now lay the partly made assembly on the floor, or some flat surface, bottom side up. Place a wood block under the stems at each end, clamping or fastening stems so that they won't move. Line up frames 1 and 3, square to the floor.

The four bottom battens may now be put in place and screwed or nailed into the notches provided in the frames. Complete the fastening of the battens by screwing or nailing to the stems at both ends.

The boat may be turned right side up now and the two full-length deck battens put in place. Install short deck battens from stem to frame 3 at the one end, and from stem to frame 1 at the other end.



8-Ft. KAYAK

Fit and fasten frames 2 at the center of the boat. Floor boards extend flush with the outside edges of the two outside bottom battens. Galvanized nails should be used to fasten the floor boards, and nails should not come through the bottom because they will rub on the canvas causing wear and eventually a hole. Parts No. 6 may now be fitted and nailed in place.

All nails and screws should be examined to see if they are set slightly below the surface of the wood. Remove all sharp edges on battens on the bottom and sides of the boat. Round slightly the sharp edges of the stems.

Apply one coat of good lead paint to the completed framework.

The canvas covering goes on in one piece. No difficulty should arise here, but time and patience are required to do a good job. Stretch the canvas from end to end over the bottom of the boat, pulling up tight over the stems, and fastening at center of frames 1 and 3 on the top side. Pull up the sides of canvas tight and fasten to deck battens at frames 2. Work from the center of the boat toward the stems, pulling canvas up in a vertical direction, tacking to the top edge of deck batten. If the canvas is pulled in a slanting direction more wrinkles will develop. Wrinkles may be spread out evenly between frame 2 and stems, and if spread out enough during the process of pulling and tacking, may be removed by shrinking with water. Seams are necessary at the ends of the canvas as shown in the drawing, and should be cut carefully. A ½-in. fold is made at each seam, and marine glue or paint should be used here before tacking. The whole canvas covering should now be given a good sponging with water and allowed to dry. If any wrinkles remain, tacks should be loosened and wrinkles removed.

After the painting has been completed, the four protective skids may be fastened on the bottom. Four beads, two on the sides and two on the top, add finish and protection. To complete the cockpit, add two combings one at each end.

Due to the wide beam of this kayak, the paddle may have to be made 9-ft. over-all length, depending on the size of the individual.

Bill of Material

Part No.	*No. Required*	*Material*	*Size*
1–3	1	Spruce S2S	¾ x 10" x 7'
4	1	Douglas fir	2 x 3" x 4'
5	9	Straight-grained spruce	¾ x ¾" x 8'
6	1	Spruce S2S	¾ x 2½" x 6'
7	4	Douglas fir S4S	⅜ x 1¾" x 10'
8	1	Douglas fir S4S	½ x 2½" x 4'
9	4	Half-round molding	¼ x ⅝" x 8'
10	4	Spruce	⅜ x ¾" x 8'
11	1	Douglas fir ply	¼ x 9" x 2½"
12	1	Douglas fir round pole	1⅜ x 1⅜" x 8'

50	Screws, f.h. brass, No. 10 by 1½"
¼ lb.	Finish nails, galvanized, 1"
¼ lb.	Finish nails, galvanized, 1¼"
½ lb.	Copper tacks, 10-oz., ⅝"
1	Double-filled white duck canvas, 10-oz., 60 in. by 4 1/3 yd.
1 qt.	Lesscoat (canvas filler)
12 lb.	Zinc compound
⅓ gal.	Linseed oil
⅓ gal.	Turpentine
1/16 gal.	Pigment ground in oil
¼ gal.	Satin auto oil clear

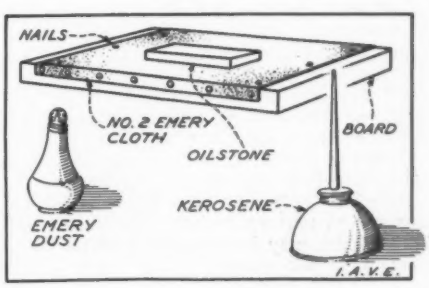
Painting Specifications

1 coat Lesscoat to seal the pores in canvas
2 coats zinc compound thinned with linseed oil and turpentine
1 to 2 coats satin auto oil clear, mixed with pigment ground in oil, 2 to 3 lb. pigment to 1 gal.

TRUING UP WORN OILSTONES

Roy I. Foster, Parrish Junior High School, Salem, Oregon

Nail or glue a piece of No. 2 emery cloth about 6 by 11 in. in size onto a smooth board. Nail only around the edges. Clamp to bench and rub the worn oilstone on the emery



cloth with a push-and-pull motion. As the emery begins to wear away, apply fresh emery dust to the cloth and moisten with kerosene or water. Fresh emery dust can be sprinkled onto the cloth very nicely from a discarded salt shaker. This method seems to give quicker and better results than rubbing the stone on a piece of cast iron or a piece of plate glass.

CUTTING BLOCKS FOR EASTER CARDS

May Lillian Lampe, Weehawken, New Jersey

With the approach of Easter, the thought of Easter greetings arises quite naturally. Easter cards depicting pretty little white bunnies or bright downy chicks thrill the children, and a religious subject gives new inspiration to the more serious minded. Or, you may choose to cut a block showing your favorite church window or doorway.

Select a simple subject so that the composition will be easy to cut. If you are interested in outdoor life, it will not be difficult for you to tour your city in search for material which may be captured with pencil or camera. In this way attractive church studies may be made. Residing in the suburbs, there may be downy chicks or fluffy baby bunnies to snap.

Decide on the size card that is to be designed and have the linoleum block cut accordingly. Next make a pencil sketch the size of the block on a piece of paper, copying from the photograph or sketch. Do not crowd too much detail on a small block. Then decide on the kind of lettering that is to be used for the greeting. Because this lettering is merely to convey an idea, it need not be as accurately done as in mechanical drawing. The lettering should be part of the design and developed freehand. The old Roman and old English styles are both appropriate for greeting cards. Calligraphy, too, is artistic and effective, and is used a great deal today in commercial advertising.

The old Roman is the foundation of all modern lettering. There are three general forms: Early or classic, Renaissance, and the modern. Old English is the most familiar style of Gothic, and for this reason harmonizes beautifully with a religious subject. A leaded church window or doorway is most attractive with Old English lettering. Never use all caps. Upper- and lower-case lettering will be much easier to read. The letters of the eleventh to the fifteenth centuries are Gothic. They are essentially written letters, made with one stroke of the pen. In this country the word *Gothic* is taken universally by printers, engravers, lithographers, and artists to mean the plain, bold letter made with uniform strokes and without serifs. Since this style of lettering is in such general favor commercially, the style has been called "Commercial Gothic." It also is known as the block letter. It can safely be used wherever boldness and legibility are more important than mere artistic effect.

In the fifteenth century when printing was invented, the choice of type was limited. Gothic and script were almost the only styles used and the type used today is of the Carolingian, Gothic, Roman, and Italic origin.

To understand lettering well, a study of type is essential. This may be easily done by studying a good book on type faces. When laying out any lettering, space it so that the areas of white space between the letters balance each other. This, and not the distance between letters must be the guide. In other words, you *feel* good spacing in lettering, if it is to be truly artistic.

Recently calligraphy, or the art of beautiful handwriting, has been revived by commercial advertisers. The angle of the slant varies and is a matter of extreme individuality. For the artist and designer, a style dating back to the time of the Louis XIV to XVI gives a letter full of quaintness, grace, and austerity. This style is most valuable because of its lightness, dignity, and freedom of line. It is written at a slant of 30 deg. and is very pleasing to the eye. Lettering need not, of course, restrict itself to any one slant. Sometimes different angles are quite effectively used in the same layout.

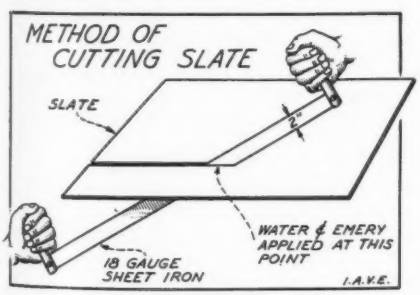
After the lettering has been layed out, it must be transferred to the linoleum block. This must be done in reverse, using carbon paper to trace it. Give the linoleum a coat of opaque paint (Linolink) first, so that the transfer will be more legible. Show areas of white spaces on black, or vice versa for contrast of values. White bunnies, for instance, should be on a dark grassy background. Use the best steel tools for cutting. Keep the tools very sharp. A fine U- or V-shaped veiner should be used to cut the fine lines. Then use the gouges for cutting the bigger areas. After the cutting is finished, make an impression and check up on the errors. Some places may not be cut deep enough or perhaps some rough lines may be made smoother.

An eggshell finish with a deckled edge makes an attractive selection of the stock upon which the printing is to be done. After all the impressions have been made, let them dry thoroughly. Then they may be hand tinted with opaque water colors. Lavenders, purples, yellows, bright greens, and perhaps a bit of orange may all be used as Easter colors. Bunnies painted in opaque white are lovely and sometimes an added touch of originality may be given to a bunny card by pasting on a tiny tail of absorbent cotton.

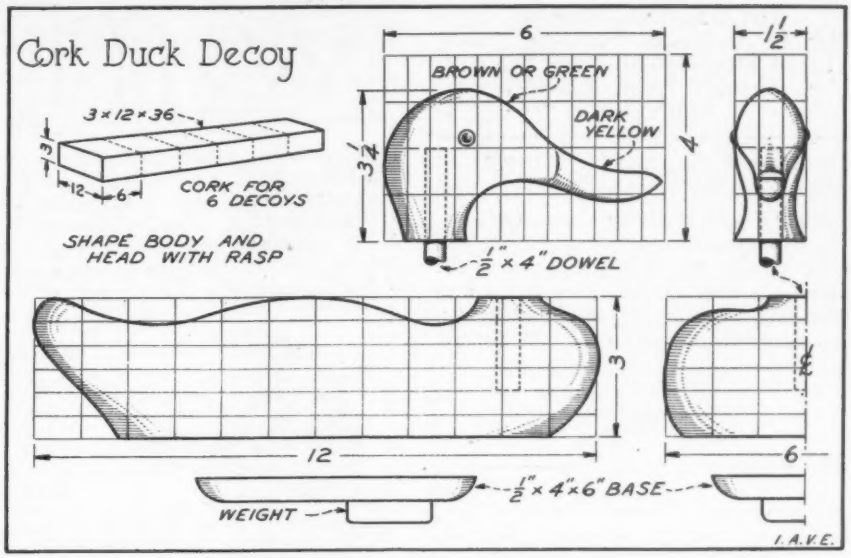
METHOD OF CUTTING SLATE

Lorne R. Lauder, Idaho State School for the Deaf and Blind, Gooding, Idaho

Frequently it falls to the lot of the school shop to take care of various items of school maintenance. Among these jobs at times is the fitting of a slate blackboard which might need a reduction in area. The following simple method of cutting slate will produce a creditable job.



First cut a strip of 16- or 18-gauge sheet iron 2 in. or wider, and several feet long. Then, affix a wooden handle by cutting a saw kerf down the center of a broom handle equal to the width of the sheet iron. Insert the handle and bore a 3/16-in. hole through the handle and metal, and insert a screw. The handle should be long enough to fit the hand comfortably. Next, place a few drops of water and medium-grade emery at the cutting edge of the "saw" with a spoon. Water and abrasive should be added frequently as the cut progresses. One might contrive a drip can for the water and carborundum if very much cutting were to be done. Boys, usually, are greatly interested in this practical project.



CORK DECOY DUCK

G. L. Simnicht, High School, Elk River, Minnesota

Material for 6 Decoys

1 pc. cork 3 by 12 by 36 in.
½ pt. cork cement
½-in. dowel rod, 24 in. long
1 pc. pine ⅞ by 6 by 48 in. for heads
6 pc. pine ½ by 4 by 6 in. for bases

Procedure

1. Divide the 3 by 12 by 36-in. pieces of cork into 6 pieces 3 by 6 by 12 in.
2. Rough out each of 6 pieces with fine-tooth crosscut saw.
3. Use coarse wood rasp to shape body of decoy.
4. Cut out and round edges of 6 pieces ½ by 4 by 6 in. for bases.
5. Cement and clamp base to bottom of the body of the decoy.
6. Bore ½ by 2-in. hole in body for fastening head with dowel rod.
7. Glue (waterproof) two pieces of scrap pine for head. Reverse the direction of the grain for strength.
8. Use pattern and trace on glued stock for head. Cut out with band or coping saw.
9. Smooth and shape head on drum sander or with wood file.
10. Use cork cement or waterproof glue to assemble body, base, and head.
11. Paint is preferably put on with spray equipment. Use flat paint to prevent a gloss finish. Steel-wool lightly when dry to remove shine.
12. Glass eyes may be cemented in or eyes may be painted on.
13. Weight decoy with lead. Any of various shaped weights are good.
14. An anchor may be made by cutting 1-in. lengths of 1-in. pipe. Set small screw eye in center, and pour molten lead around it.
15. Use rustproof materials whenever it is possible.

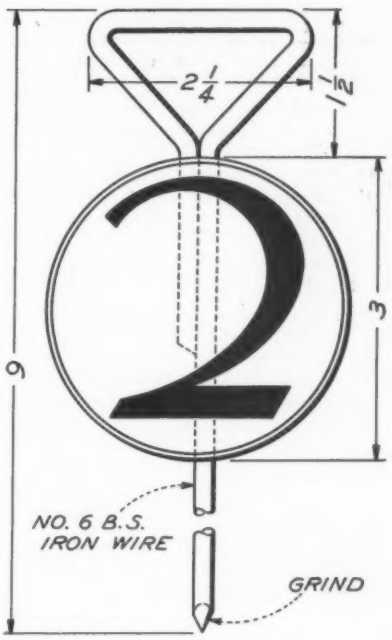
NOTE: When forming the body and putting on finish, it is a good idea to get the exact profile and colors from a picture of the type of duck that is being imitated. These pictures may be found in any of the common sportsman's magazines, *Field and Stream, Outdoor Life,* etc.

MARKER FOR MEASURING TRACK EVENTS

E. A. Rerucha, Franklin Park, Illinois

A marker for measuring the longest throws in field events such as the discus throw or the javelin throw, is illustrated herewith.

These markers are simple to make and the numbers may be made large enough to be seen at quite a distance.



The disk is a top or bottom of a tin can about 3 in. in diameter and cut from the can so that the rim or seam remains on the disk. The stake is formed from No. 6 B. & S. iron wire and soldered to the disk. Paint the disk white and the numbers in black on both sides.

Each contestant is then given a number on the data sheet and his throws on the field are marked by a stake with a corresponding number. The markers should be placed on the field so that the diameter of the disk is in line with the line of throw so as to cut down the chances of the marker being hit.

RECORDING FORMS

Tom L. Anderson, Principal, Vocational Department, Iowa School for the Deaf, Council Bluffs, Iowa

An attempt to embody attitudes as well as skills in the records and reports of the individual student.

The weekly record card emphasizes the skills as well as the attitudes of the students. It assists the teacher in keeping a running record of each pupil. At the end

Vocational Department
WEEKLY RECORD

Name..... Class.....

From.....to.....

	Week	1	2	3	4	5	6	Av.
25	Speed							
25	Accuracy							
25	Shop Language							
10	Self Reliance							
10	Industry							
10	Thrift							
10	Co-operation							
10	Dependability							
10	Courtesy							
10	Neatness							
10	Punctuality							
	Days Absent							
	Total score							

Vocational Score Card

Name _____ Class _____

Subject _____ Period ending _____

Maximum Value in Points	Performance and Character Analysis	Teacher's Rating
	Skills	
25	Speed	
25	Accuracy	
25	Shop Language	
	Attitudes	
10	Self Reliance	
10	Industry	
10	Thrift	
10	Dependability	
10	Co-operation	
10	Courtesy	
10	Neatness	
10	Punctuality	
155		Total

Health Habits ( ) Satisfactory ( ) Unsatisfactory

Grade

Semester Grade

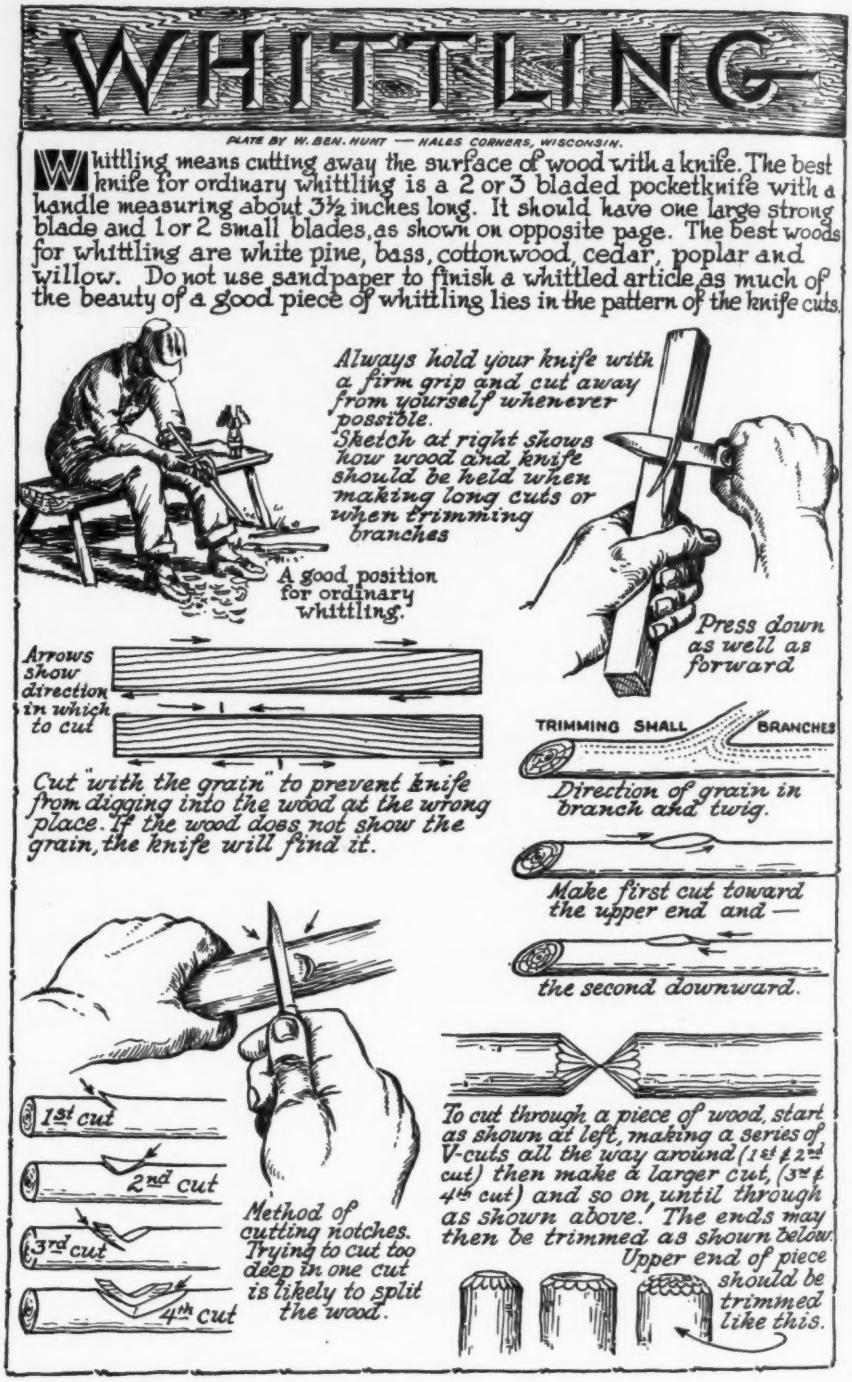
Days Absent

Scale
146 to 155 — Excellent — E
131 to 140 — Superior — S
91 to 130 — Average — M
76 to 90 — Poor — P
Below 75 — Failure — F

Teacher _____ Principal _____

of every six weeks, the averages from this card are transformed to the vocational score card. A carbon copy of this score card is then sent to the parents. The original is placed into the student's folder so that it can be used in the future to give an intelligent summary in terms of skills and attitudes if that is needed for any reason whatever.

On the reversed side of the report card, the following note has been added:


WHITTLING
PLATE BY W. BEN. HUNT — HALES CORNERS, WISCONSIN.
Whittling means cutting away the surface of wood with a knife. The best knife for ordinary whittling is a 2 or 3 bladed pocketknife with a handle measuring about 3½ inches long. It should have one large strong blade and 1 or 2 small blades, as shown on opposite page. The best woods for whittling are white pine, bass, cottonwood, cedar, poplar and willow. Do not use sandpaper to finish a whittled article as much of the beauty of a good piece of whittling lies in the pattern of the knife cuts.
A good position for ordinary whittling.
Always hold your knife with a firm grip and cut away from yourself whenever possible. Sketch at right shows how wood and knife should be held when making long cuts or when trimming branches
Press down as well as forward
Arrows show direction in which to cut
Cut "with the grain" to prevent knife from digging into the wood at the wrong place. If the wood does not show the grain, the knife will find it.
TRIMMING SMALL BRANCHES
Direction of grain in branch and twig.
Make first cut toward the upper end and —
the second downward.
1st cut
2nd cut
3rd cut
4th cut
Method of cutting notches. Trying to cut too deep in one cut is likely to split the wood.
To cut through a piece of wood, start as shown at left, making a series of V-cuts all the way around (1st & 2nd cut) then make a larger cut, (3rd & 4th cut) and so on, until through as shown above. The ends may then be trimmed as shown below.
Upper end of piece should be trimmed like this.

To Parents:

On the other side of this sheet is the Performance Analysis and the Character Analysis of your child for the period of six weeks just ended. Please notice the strong points and the weak points, as shown in the comparison of the Teacher's Rating with the Maximum Value in Points, or the highest possible score.

Since the various attitudes indicating character are known to be of great importance in securing and holding jobs, as well as in helping the individual to a happier life, they are credited in the final grade. Please watch your child's tendencies.

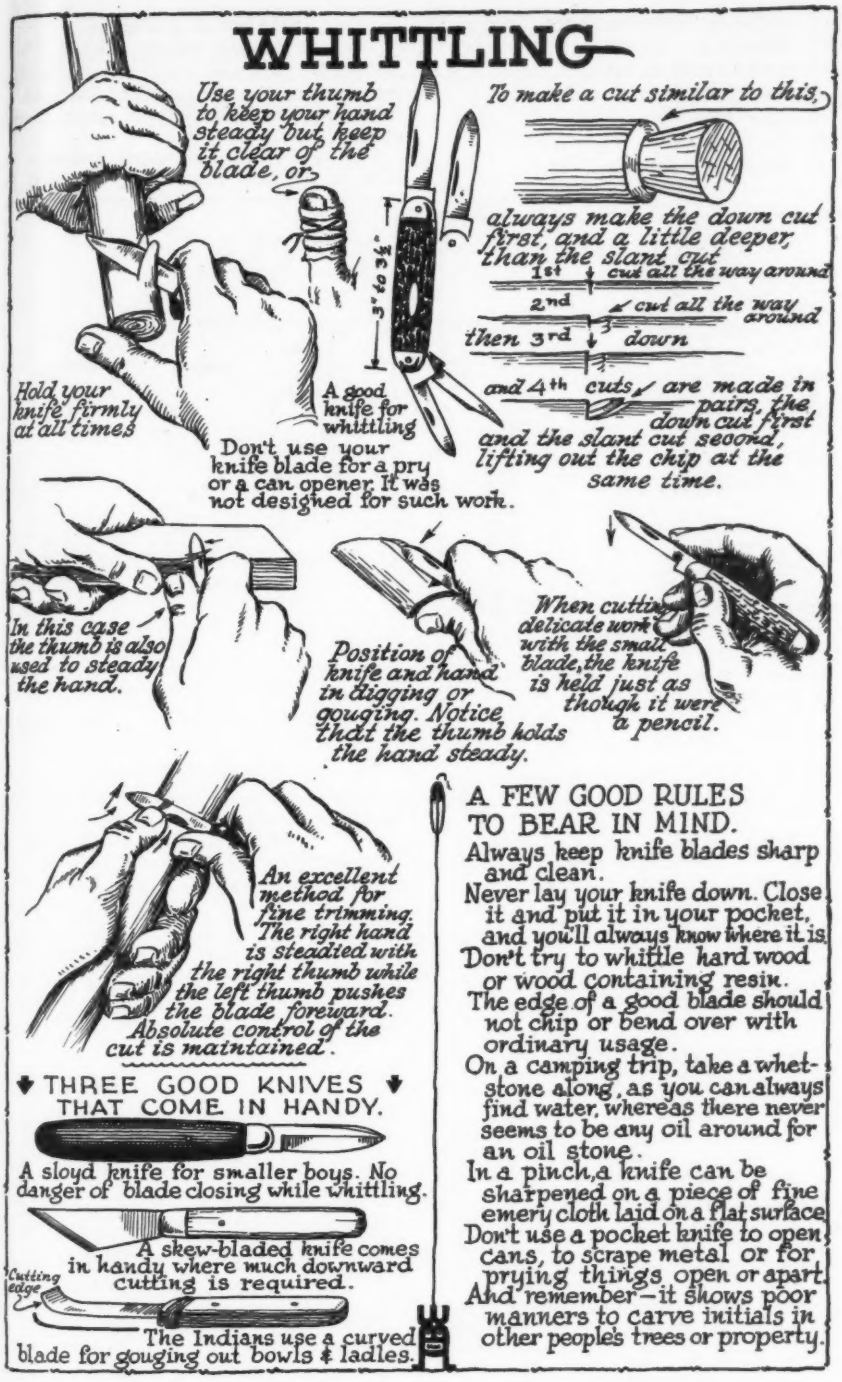
Semester grades are found twice a year by averaging the grades for the three six-week periods of the semester.

GENERAL-SHOP PROGNOSTIC TEST

Jerome Isrow, High School, Suffolk, Virginia

Directions: Place circle around correct answer.

1. Is a claw hammer a common tool in metalwork? Yes No
2. A working drawing may consist of 1, 2, 3, or even more views. Yes No
3. One board foot of lumber might measure ½ by 12 in. by 12 ft. Yes No
4. To saw with the grain of the wood, use a ripsaw. Yes No


WHITTLING
Use your thumb to keep your hand steady but keep it clear of the blade, or
To make a cut similar to this
always make the down cut first, and a little deeper, than the slant cut
1st cut all the way around
2nd cut all the way around
then 3rd down
and 4th cuts are made in pairs, the down cut first and the slant cut second, lifting out the chip at the same time.
3" to 3½"
A good knife for whittling
Hold your knife firmly at all times
Don't use your knife blade for a pry or a can opener. It was not designed for such work.
In this case the thumb is also used to steady the hand.
Position of knife and hand in digging or gouging. Notice that the thumb holds the hand steady.
When cutting delicate work with the small blade, the knife is held just as though it were a pencil.
An excellent method for fine trimming. The right hand is steadied with the right thumb while the left thumb pushes the blade forward. Absolute control of the cut is maintained.
THREE GOOD KNIVES THAT COME IN HANDY.
A sloyd knife for smaller boys. No danger of blade closing while whittling.
A skew-bladed knife comes in handy where much downward cutting is required.
Cutting edge
The Indians use a curved blade for gouging out bowls & ladles.
A FEW GOOD RULES TO BEAR IN MIND.
Always keep knife blades sharp and clean.
Never lay your knife down. Close it and put it in your pocket, and you'll always know where it is.
Don't try to whittle hard wood or wood containing resin.
The edge of a good blade should not chip or bend over with ordinary usage.
On a camping trip, take a whetstone along, as you can always find water, whereas there never seems to be any oil around for an oil stone.
In a pinch, a knife can be sharpened on a piece of fine emery cloth laid on a flat surface.
Don't use a pocket knife to open cans, to scrape metal or for prying things open or apart.
And remember—it shows poor manners to carve initials in other people's trees or property.

5. Check the marking gauge with a rule before using. Yes No

6. A jackplane is a large machine power planer. Yes No

7. The backsaw is used for heavy sawing. Yes No

8. On a woodworking chisel the bevel is on both sides. Yes No

9. Should the rule ever be placed on edge when measuring stock? Yes No

10. A bit with the figure 8 stamped on the shank is used to bore a ½-in. hole. Yes No

11. Varnish is thinned with alcohol. Yes No

12. Sanding should be done after all cutting work is completed. Yes No

13. To anneal copper, it must be heated. Yes No

14. A flask is a bottle used in molding. Yes No

15. Brass is cheaper than copper. Yes No

16. All large patterns must have draft. Yes No

17. Pickle is a solution used for cleaning metal. Yes No

18. Borax may be used as a flux for soldering. Yes No

19. A ladle is used for pouring water. Yes No

20. Magnets are used in forging. Yes No

21. Snips are used for cutting sheet metal. Yes No

22. A brake is used by a sheet-metal worker. Yes No

23. Galvanized iron will not rust. Yes No

24. A ball-peen hammer is used for decorating a metal surface. Yes No

25. Alundum wheels are used for grinding. Yes No

26. Drills are made of mild steel. Yes No

27. Electricity may be produced by rubbing one object on another. Yes No

28. Voltage is the measure of the amount of electrical current. Yes No

29. No. 28 magnet wire is smaller than No. 20. Yes No

30. Nichrome wire is used in heating elements. Yes No

31. A house fuse aids in the prevention of fires. Yes No

32. A hydrometer is used in testing altitude. Yes No

33. An ammeter is used for testing voltage. Yes No

34. Doorbells operate on 110 volts. Yes No

35. Thomas A. Edison invented the incandescent lamp. Yes No

Section II

Directions: Complete each of the following statements with only one of the numbered expressions.

36. The storage battery in the average automobile delivers current at a pressure of .....
(*a*) 4 volts (*b*) 3 volts (*c*) 6 volts (*d*) 10 volts

37. Oily rags should be .....
(*a*) left around (*b*) put on the shelf (*c*) placed in metal container (*d*) put in the drawer

38. Gasoline is mixed with air in the .....
(*a*) cylinder block (*b*) tank (*c*) carburetor (*d*) pump

39. Streamlining increases the ..... of a car.
(*a*) cost (*b*) speed (*c*) flow of water (*d*) seating capacity

40. An engine may be cleaned with .....
(*a*) stiff-bristled brush and kerosene (*b*) by washing with water (*c*) by scraping with a knife

41. The power developed by the exploding gasoline is transmitted to the crankshaft by the .....
(*a*) fan (*b*) pistons (*c*) generator (*d*) transmission

Section III

Directions: In the blank space, write the letter of the words related to the words in the numbered column.

42. First aid .....
43. Open-grain wood .....
44. Shellac .....
45. Underwood .....

46. Delta ..... *c*) machinery manufacturers
47. Requisition ..... *d*) Johnson's
48. Shop superintendent ..... *e*) checks on clean up
49. Stock and supply foreman ..... *f*) black sec. around machine
50. Danger area ..... *e*) paste filler
    a) alcohol *g*) gives out tools
    b) typewriter *h*) request for supplies

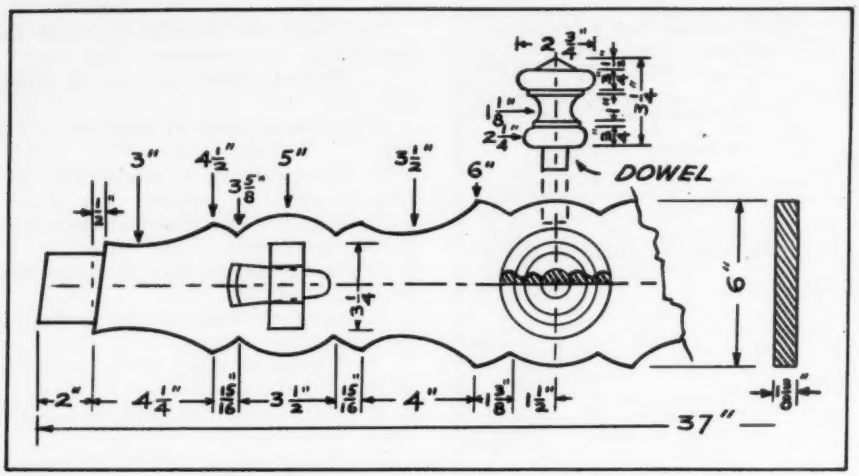


Fig. 2. Detail of stretcher, dining-table size

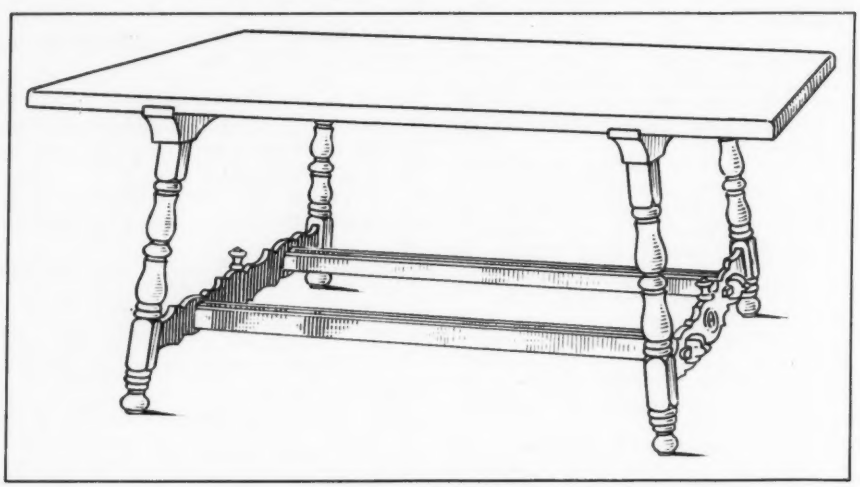


Fig. 3. Den table

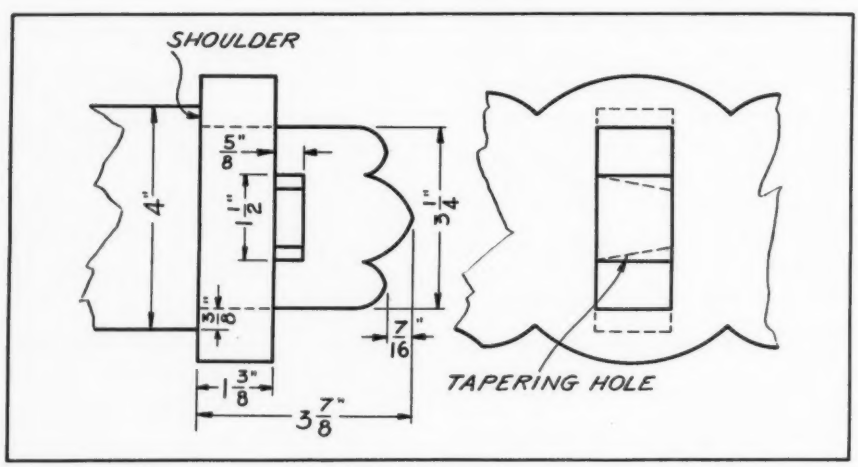


Fig. 7

SPANISH TABLES

J. I. Sowers, Miami, Florida

Spanish furniture has many charming features, and the present taste for color in furnishings should make for a general revival of Spanish art.

The table design presented herewith has been so designed that it may be used for

Fig. 1. Coffee table

constructing a coffee table, a den table, or a dining table.

The Coffee Table

This is shown in Figure 1. The sizes suggested are height, 20 in., width, 17 in., length, 22 in. The splay (angle) of the legs may be

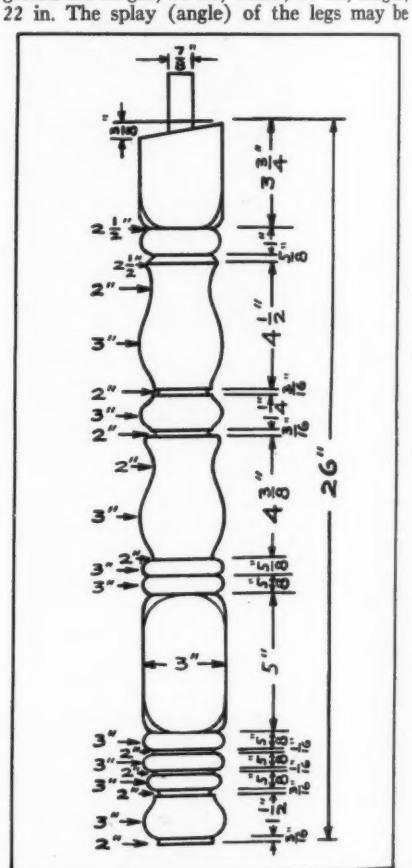


Fig. 6. Detail of leg for den or dining table

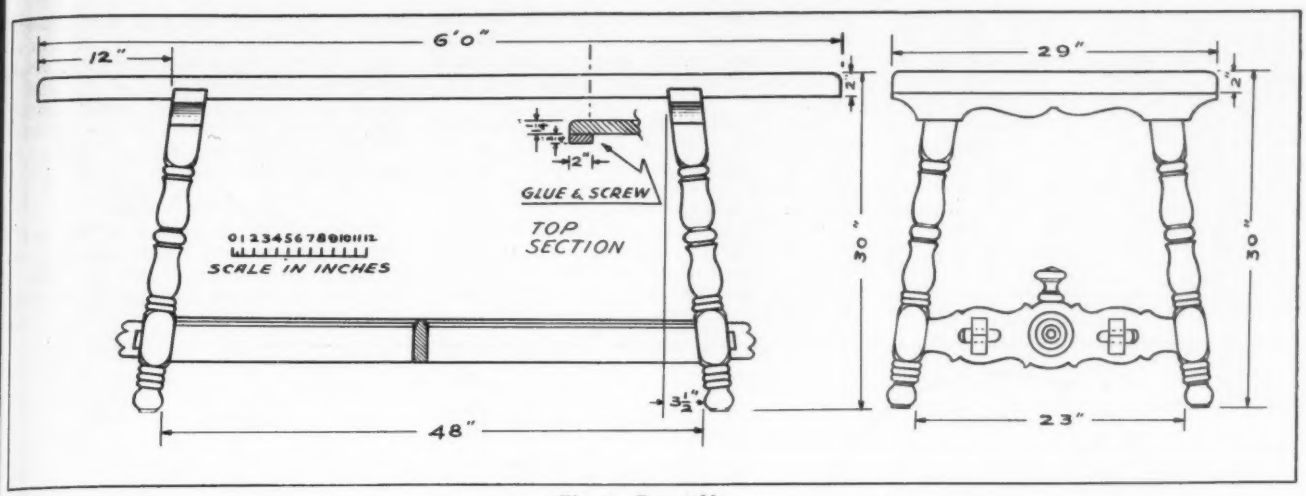


Fig. 4. Den table

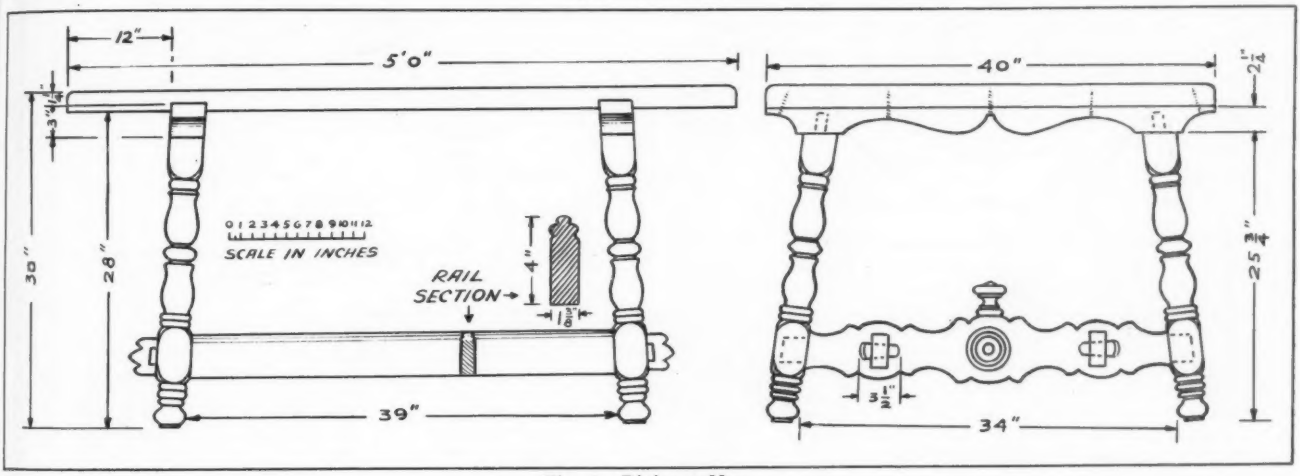


Fig. 5. Dining table

made 2 to 3 in. The bottom of the legs in any splay-legged table should be on a line with the top, but should not project beyond it. The end stretcher will be a modified form of that shown in Figure 2. The turning of the legs should be similar to that of the leg in Figure 6. The legs are 1½ in. square for this small table.

The top may be tiled as shown, or it may be a wood top. A tiled top is, perhaps, more desirable, as it takes care of the heat situation, and adds to the beauty.

The Den Table

This table, besides being useful in a den, fits very well in the board of directors' room, the library, or some similar room. This table is shown pictorially in Figure 3, and orthographically in Figure 4. It is characteristic of Spanish tables that they do not have side rails. In spite of this, these tables are very strong and rigid. The top is 2 in. thick. A similar effect may be obtained by adding a strip along the edge of the top as shown in section in Figure 4. This makes the table lighter, and the dado for the crossbeam need not be cut across the full width of the table top.

The Dining Table

The front and end views of this table are shown in Figure 5. It is made the same as the den table except that the sizes for the top are changed. This, of course, calls for corresponding changes in the understructure. The leg for both the den and dining table is shown in detail in Figure 6. Care should be taken to make good sharp curves in turning, or the vigor which is common to this style will be lost.

The end stretcher shown in Figure 2 is designed for the dining table. Suitable changes must be made to fit it to the den table. The rosette ornament on the stretcher is to be turned and applied. It may be varied in design to suit the individual.

The cross rails, a detail of which is shown in Figure 7, are mortised into the stretcher and secured with pins. These hold the table very firmly if accurately made.

The Finish

Oak is perhaps the most desirable wood for Spanish furniture, though mahogany and sometimes chestnut are used. In any event, no matter what wood is decided upon, the stain should be what is known as Spanish brown. This is very similar to walnut stain, which may be used instead. The wood is not filled, nor is it varnished. After staining, apply a thin wash coat of shellac (shellac as ordinarily used, diluted with four parts alcohol) to hold the stain. Then finish with an oil-rubbed finish, or wax the table. The top of the dining table, however, for protection in use, should be given a coat of the best rubbing varnish, and then rubbed down to a dull finish.

CANDLESTICK ASH TRAY

Leon H. Baxter, Association for Crippled and Disabled, Cleveland, Ohio

The candlestick shown in Plate 8 has a modern touch added by the two holders soldered to the rim. These, of course, may be left off if desired.

To form the pan itself, read carefully the directions for raising over a stake described in the directions for the first candlestick of this series. If these directions are carefully followed, little trouble will be encountered in raising this simple form. The disk is of 18-gauge copper, 6¼ in. in diameter, and planished all over.

It is well at this point to make the two holders for cigarettes. These are of 18-gauge copper. A paper pattern should first be made ⅞ by 1⅛ in. Fold this paper and sketch one half the outline. Cut out with scissors. Make two of these paper patterns and glue them to scrap pieces of copper. Saw out and file the pieces to the true outline. Planish both surfaces and edges. Cup these out evenly by pounding on a lead block. They must be exactly alike.

Take the compass with the radius equal to that of the upper edge of *A*, and apply it six times around this edge. The radius of any circle will divide that circle into six equal parts. On every other mark will go the two holders and the handle, thus dividing the edge in a uniform manner. At the two points where

the holders are to be located, use a medium half-round file, and file out a depression that will accurately conform to the shape of the holder. Turn the pan *A*, over with holders evenly placed in their proper places. Put a small block of wood under the point where the handle is to be attached to shim up the pan evenly. Apply flux and small pieces of solder to the contacting edges of the holders and pans, and apply heat. See "Soldering," page 305, September, 1938, of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. The handle is of 16-gauge copper, ¾ by 6½ in. Planish this on all surfaces, and edges, and anneal to soften. Bend carefully to the form shown, using a piece of ¾-in. pipe held in a vise. Place the handle against the outside edge of pan *A*, in the position shown in the front view. Locate two rivet holes at desirable points, and drill these centrally in the handle. Locate points on the pan to coincide with these holes, and drill these also. Rivet the handle to the pan by the method described under "Riveting," page 306, September, 1938, issue.

Holder *B* is made by either of the two methods described on page 304 of the September, 1938, number. If it is to be made from flat stock, use 18-gauge by 2⅛ by 2⅞-in. copper. This length, 2⅞ in., insures sufficient stock to insure its folding to a ⅞-in. inside diameter, which is the size required for an ordinary candle. Cut accurately and have the adjacent edges square and true. Planish on the outer surface. Form over a ¾-in. piece of rod, or pipe, and wire together as in Figure 9, page 304, September, 1938, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. Place flux and solder as shown, and apply heat.

Make the drip pan *C* of 18-gauge copper, 1¾ in. in diameter. Cut to outline and file smooth. Locate a 13/16-in. circle at the center point of disk *C*, and drill a small hole in which the saw blade is inserted. Saw and file to the line. Planish upper surface and edge of disk *C*.

Place *C* planished surface downward, and on this place holder *B*. See that the central openings coincide, and then place flux and solder along the outer edge of holder *B*, and apply heat with blowtorch.

Place bits of solder and flux on the inside edge of holder *B*, and locate carefully in the center of pan *A*. Solder as before, clean thoroughly all over with fine steel wool and finish as desired.

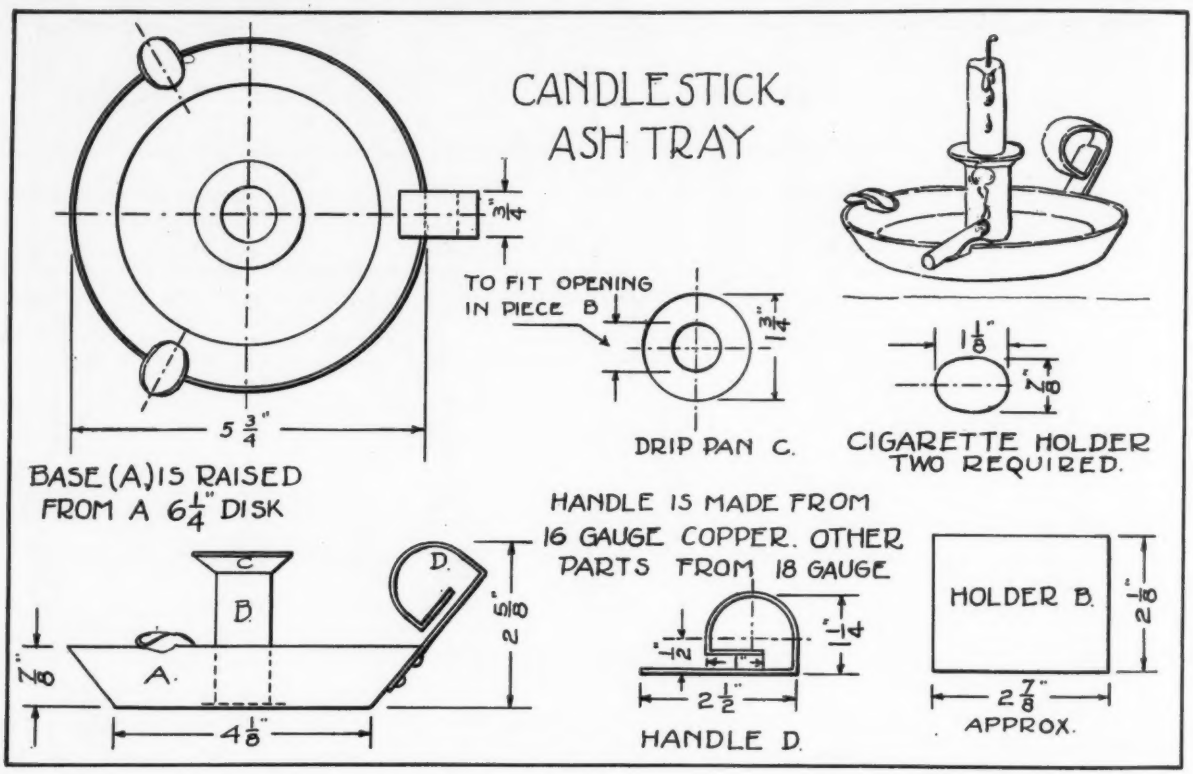


Plate 8

CATTLE-HORN PROJECTS

Herbert Ment, State Normal School, Oswego, New York

From very early times, cattle horn has been a very important material from which household implements, musical instruments, and weapons were made. In past centuries, horn drinking vessels, spoons, hunting horns, powder horns, and bow tips were commonplace — now they are a rarity. Modern industry and invention have substituted metals, glass, and plastics for most of the uses to which horn was put. Even though commercially obsolete, horn makes an excellent material for arts-and-crafts work as well as for general shop projects.

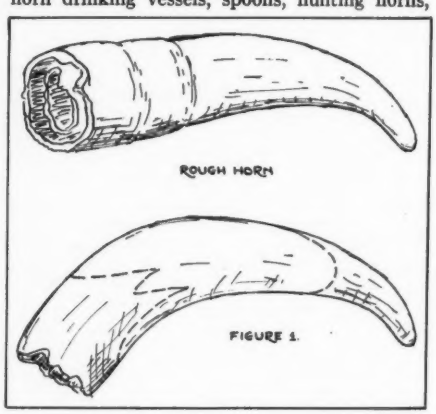


FIGURE 1.

Teaching Values

1. Because the utilization of the natural form of the horn is largely necessary, the worker is compelled to adapt his design to the material in hand. This job of adaptation is a creative activity for it is rarely that any two pieces can be made alike. Thus, horn work becomes an agent in the development of individual abilities.

2. Appreciation of good design and appropriateness.

3. Understanding of some of the problems and accomplishments of ancient industry.

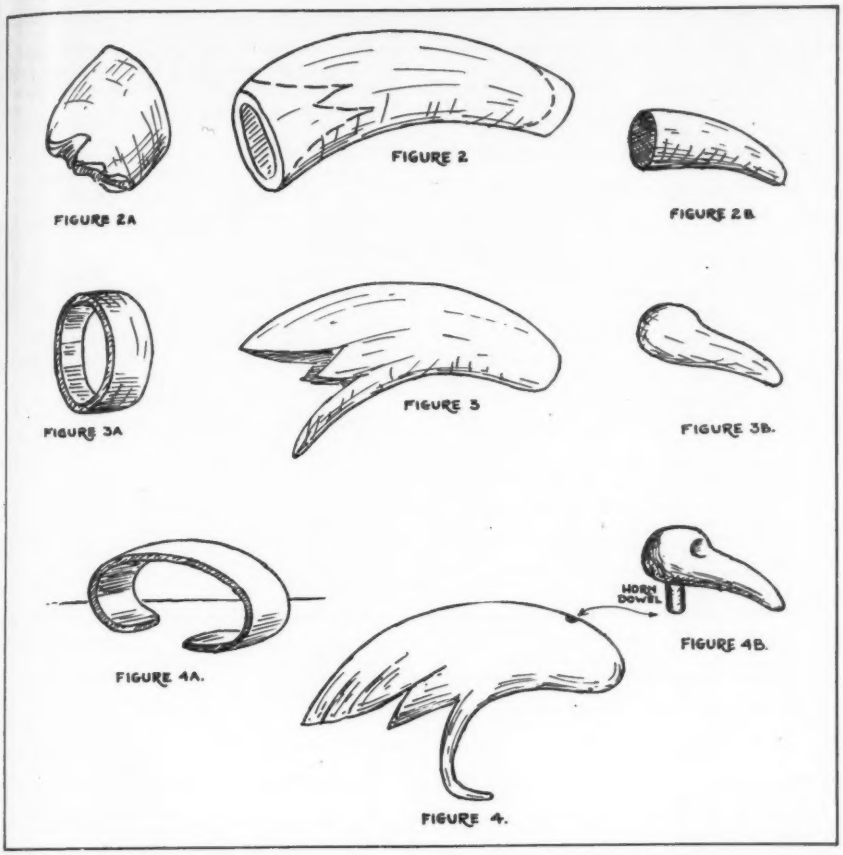
4. Introduction to the use of hand tools as applied to materials other than wood and metals.

5. This work makes an excellent hobby, and as such should be offered to students along with the other activities for leisure.

Teaching Points

The following teaching points are called for by the work itself and as a result of the aims previously indicated:

1. Freehand sketching.
2. Proportion and design.
3. Use and care of hack saw, hand drill, coping saw, hand scraper, files, engraving tools, burning needle, buffing wheel, knife, Bunsen burner or alcohol lamp, pressure cooker.
4. Polishing.
5. Cementing.



6. History of the use of horn and its associated materials, bone and ivory.

Suggested Projects

For those who would stay with jobs that sound familiar, the following are highly recommended: Belt buckles, tie slides, rings, paper knives, buttons, bracelets, napkin rings, drinking horns, coat hangers, art-metal mallets, Indian necklace ornaments.

Another type of project is definitely modern in design, is decorative, and offers many possibilities to the worker with an active imagination.

1. Birds. Water birds are most adaptable.
2. Sailboats. Both hull and sails of horn, or hull alone (sails and mast may be made of copper).
3. Bud vases, wall brackets for vines.
4. Trays.
5. Book ends.

In this group of projects, the most pleasing results are achieved when horn is used in conjunction with wood, wrought iron, copper, brass, and plastics.

Techniques and Formulas

1. *Cleaning:*

a) With a cabinetmaker's hand scraper or the sharp edges of broken glass, scrape the horn to remove all scratches and scars.

b) Wash surface with a strong soap made by boiling 20 parts coconut oil with 10 parts soda lye. Then cool partly and add 15 parts rottenstone.

c) To clean inside of horn, boil it for short time, and then pry the bone loose. Scrape inside with narrow spring steel scraper.

2. *Bleaching:*

a) An aqueous solution of ammonia followed by immersion in hydrogen peroxide.

b) Aqueous solution of sulphuric acid, or chloride of lime, or chlorine.

c) Expose wet to dilute fumes of burning sulphur.

3. *Staining:*

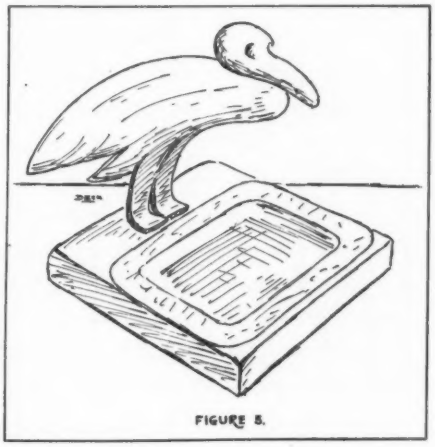
a) For brown stain, dip the horn in aqueous solution of potassium ferrocyanide. Then dry it, after which treat with hot dilute solution of copper sulphate.

b) For black stain, prepare 50 to 60 grains of silver nitrate dissolved in 1 oz. of water. Paint this on with a brush, then expose to sunlight.

4. *Adhesives:*

a) Horn to bone: 6 parts linseed oil, 5 parts mastic, 2 parts turpentine.

b) Horn to shell: Dissolve 500 parts animal glue in 125 parts alcohol (in water bath), 10 parts powdered alum and heat. Add water if too thick.



c) Horn to glass: 1 part gold size and 1 part waterglass, or 2 parts of gelatin heated in 20 parts of water.

5. *Welding.* Ends of pieces to be welded should be heated in excess of 400 deg. F., then pressed firmly together and held so until cool.

6. *Softening.* Heat in boiling water for about one-half hour, then hold in flames of burner until the temperature reaches approximately 400 deg. F. Remove from flames frequently to prevent charring. Or, lay horn into the following solution for ten days: 1 part water, 3 nitric acid, 2 wood vinegar, 5 tannin, 2 tartar, 2.5 zinc vitriol.

7. *Polishing.* File, scrape, and sand surface until smooth. Then high polish by one of the following methods: Tin oxide on cloth; rouge on cloth or buff; rottenstone and linseed oil on cloth.

8. *Bending.* When the material has been softened, sections to be flattened may be placed in a vise between two pieces of hardwood and left until they "freeze." If a piece is to be bent to a sharp angle, two pairs of pliers may be used to hold and bend the work. If large sections are to be bent, it is desirable to make up special wooden jigs.

Important: Do not try to bend horn that has begun to cool. This will result in fractured laminations.

9. *Cutting.* For most purposes, the hack saw and coping saw will be found best. However, for some roughing cuts, the band saw will be found convenient.

Caution: Knives will be found dangerous because they tend to scallop out and slip along the surface of the work.

10. *Shaping.* For shaping irregular forms such as the head of a bird, files and sandpaper will be found best. To finish these surfaces they may be scraped and polished as indicated.

11. *Mounting.* If the horn is to be mounted on any of the materials mentioned in section No. 4, the appropriate formulas should be used. If on the other hand, wood or metal are to be used, then escutcheon pins or rivets respectively should be used.

12. *Engraving and Decorating.* The larger size engraving tools used by metalworkers are suitable for horn work. The tools are handled in the manner practiced when engraving metal. Straight lines near edges or on convex surfaces may conveniently be scored with the sharp edge of a file.

Designs may be burnt into the surface with a pyrograph needle. Care should be taken not to press too heavily or to remain at any one spot too long, for very deep burns will result; also, a ring of discoloration will be left around a bad burn. To color these designs, a waxlike *monogram filler* may be used. This comes in stick form and is rubbed into the design. The excess is wiped off. Colored inks may be used if monogram filler is not available. However, there is a tendency for ink to seep into the horn. This results in fuzziness. A good substitute is common wax crayon.

Where the design calls for it, beads and flat sections of other materials may be inlaid. This should be done in moderation lest the work become gaudy and inappropriate.

NOTE: Information as indicated in sections Nos. 3, 4, 7, 9, 10, 11, and 12, may also be applied to projects made of bone.

Procedure for Making and Mounting a Bird

1. Scrape and clean the horn.
2. Taking advantage of the shape of the

horn, sketch in the design for the bird. Leave the very tip of the horn for the head. Be certain that the legs are sketched sufficiently long so that they may later be bent under. See Figure 1.

3. With a hack saw, cut away the waste material at each end, as shown in Figure 2.

4. With the hack saw and coping saw, cut along the sketched lines and blank out the shape of the bird. See Figure 3.

5. With file and sandpaper, round the breast and smooth up the job.

6. Soften the underside of the body.

7. Bend the legs as shown in Figure 4.

8. Polish the body.

9. Shape the head. See Figure 3B.

10. Polish the head and drill hole for horn dowel. See Figure 4B.

11. Drill holes for eyes and cement in glass beads.

12. Drill dowel hole in body. Make dowel very hot, put in hole and press head on to body very tightly.

13. Make oblong wooden base for bird; cut recess into base to receive copper ash tray.

14. Drill holes in feet of bird to fit escutcheon pins.

15. Mount bird as shown in Figure 5.

16. NOTE: Feathers may be engraved on the tail if desired. This would be done as Step 5A and as described in section 12.

NOTE: Figures Nos. 2A, 3A, and 4A indicate how waste material may be used for bracelets, napkin rings, and the like.

References

School Arts Magazine, June, 1936.
Scientific American Compendium of Formulas.
Henley's Book of Formulas.
Handicraft, Lester Griswold.

Sources of Supply

Local farmers, slaughter houses, and tallow works are usually glad to supply horns, either gratis or at nominal charges.

WROUGHT-IRON TABLE LAMP

Henry L. Rosse, High School, Eddystone, Pennsylvania

One who carefully designs his projects to develop an appreciation of the beautiful, through the medium of a metal-arts program, will find in this table lamp, the "C" curve, glorified with contours of grace and dignity.

The simplicity of the beautiful lamp shown herewith, makes it possible for an amateur craftsman to construct it without difficulty.

Before any construction is started, a full-sized layout of the plan should be made.

Construction of the Shaft

The first operation is making the lamp shaft, comprised of two *C* curves.

Select two pieces of band iron for items *A* and *B*, Figure 1.

Flatten the ends of the stock until enough metal is expanded to form the shape shown in Figure 1.

Next, planish both sides of the metal with a ball-peen hammer, making the depressions even and close together.

Care must be taken at this point not to rush the operation. The best results can be obtained by placing the material being planished against a firm hardwood surface, preferably end grain.

Shape both ends of the stock as shown at Figure 1 retaining the dimensions of *A* and *B*.

Lay out the location of the holes as shown in Figures 1 and 2, then drill or drill and tap the holes as specified.

Sheet-Metal Trim

Lay out piece *C* to the size shown in Figure 2, using No. 22 gauge black iron.

Planish one surface and the opposite side of the scroll. Lay out and drill the holes for fastening trim, allowing 4½ in. between centers for two ⅛-in. (lamp shaft) anchor bolts, or for two 3/16-in, rivets.

Drill also the two ⅛-in. holes for No. 5 by ½-in. r.h. screws to clear the scroll.

Bending A, B, and C

Bend pieces *A*, *B*, and *C* to the specified shape using a bending fork or any other device to obtain the proper form. Be careful not to mar the planished surfaces.

The Lamp Base

Carefully select a piece of curly black walnut for the base. Surface plane, lay out, and work to proper shape. Using piece *C* as a

Bill of Materials

Item	*Quantity*	*Description*	*Size*	*Material*
A	1 pc.	Lamp Shaft	⅛ by 1 by 30¼ in.	Band Iron
B	1 pc.	Lamp Shaft	⅛ by 1 by 7 in.	Band Iron
C	1 pc.	Sheet-Metal Trim	No. 22 by 6⅜ in.	Black Sheet Iron
D	1 pc.	Base	13/16 by 7 by 9 in.	Curly Black Walnut
E	1 pc.	Ball and Socket Coupling		Brass
	1 pc.	Close Nipple	⅜ by 1 in.	Brass
F	1 pc.	Lamp Socket	Medium Screw Base	Chromium
G	1 pc.	Felt	8 by 10 in.	
H	1 pc.	Lamp Shade	4 in. Dia. by 3½ in.	
I	2 pc.	Roundhead Black Iron Bolts or use 3/16-in. rivets	⅛ in. Dia. by ¾ in.	Black Iron Black Iron
J	1 pc.	Roundhead Black Iron Rivets	⅛ in. Dia. by ½	Black Iron
K	2	Roundhead Screws	No. 5 by ½ in.	Blue Steel
L	1	Male Plug		
M	1 pc.	Lamp Cord		

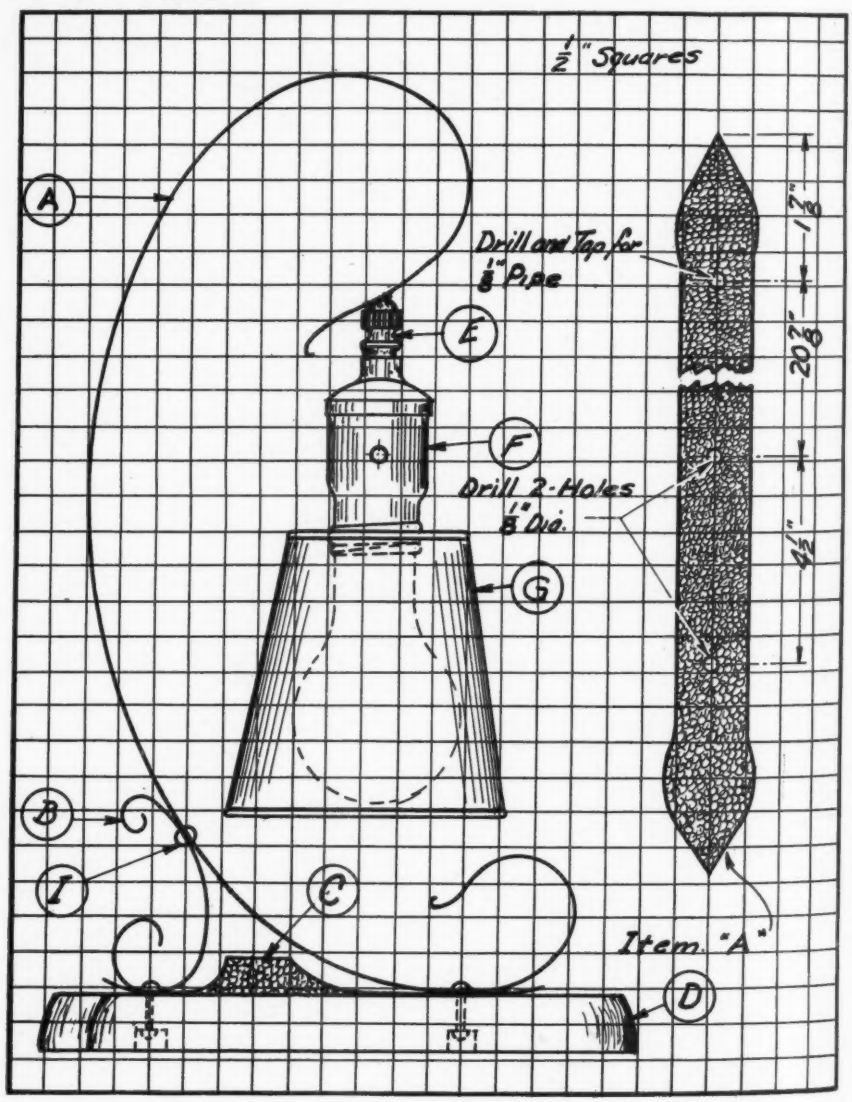


Fig. 1. Wrought-iron table lamp

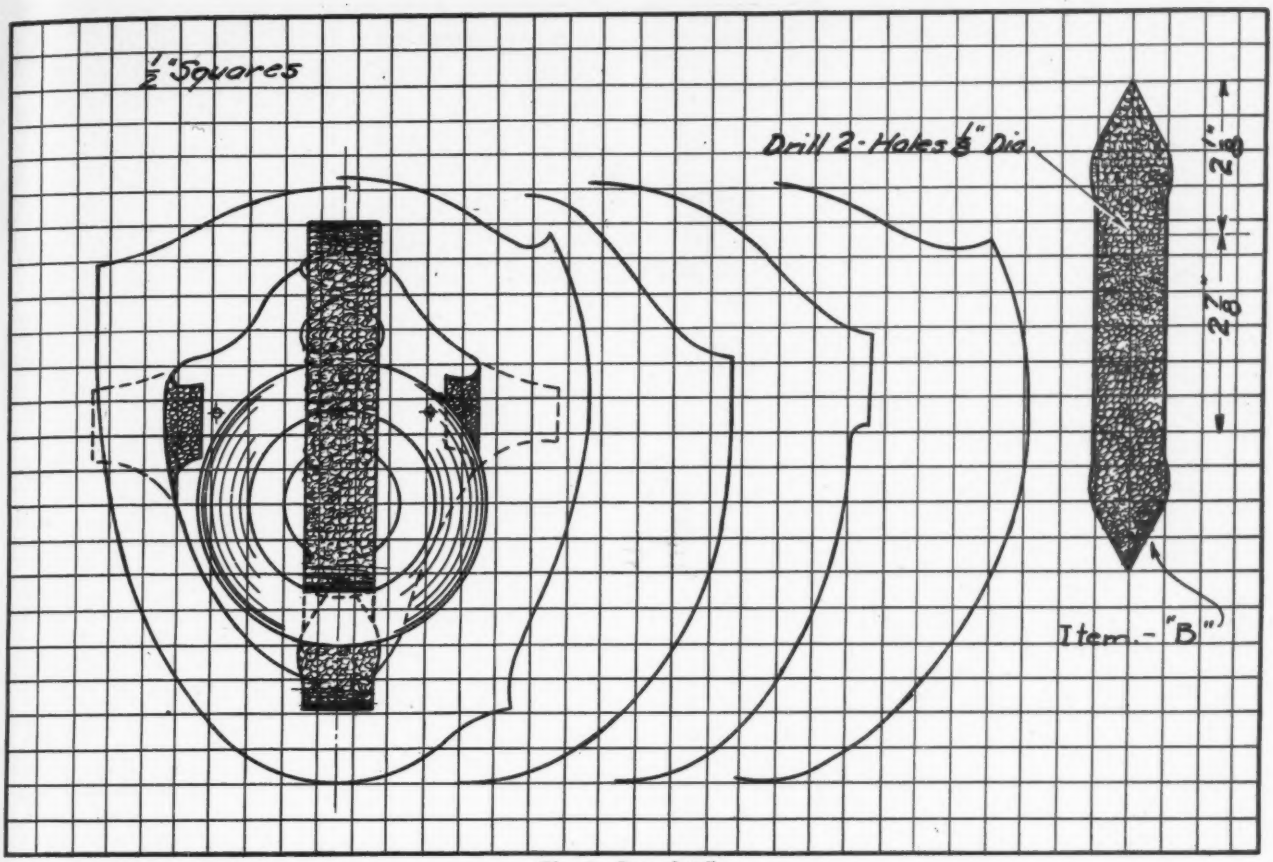


Fig. 2. Base details

template, drill the holes for the retaining screws, and two ⅜-in. holes, counterbored ½ by ¼ in. from the bottom, for the ⅜ by ¾ light shaft retaining bolts, or for the 3/16-in. rivets. These latter two holes should be counterbored if the bolts are used. It will be found that the rivets really look more beautiful than the bolts when the lamp is finished. Stain and varnish before assembly.

Metal Treatment

To prevent rusting, coat the metal with linseed oil, and heat it at a low temperature. Be careful not to apply too much heat, otherwise the oil will harden and the metal will become discolored. After heating, rub off the remaining oil with a clean rag or waste.

Then rub the high points of the surface with fine steel wool, or with fine emery cloth, to bring out the beautiful features of the planished surface. This must be done carefully, of course, to prevent dulling the sharp planished features.

A coating of solder on items *E* and *F* will dress them to harmonize with the wrought iron and walnut, if these parts cannot be obtained in the oxidized form.

Assembly

1. Fasten *E* to *A*, and cut off and file any excess metal which might protrude.
2. Rivet together *A* and *B*.
3. Fasten *C* to the base.
4. Fasten *A* and *B* to *C* and *D*.
5. Apply glue and felt to the base, clamp in the place to dry. Then trim off the surplus felt with a sharp knife.
6. Rub the iron and wood with wax.
7. Wire lamp, and fasten the remaining fixtures in place.

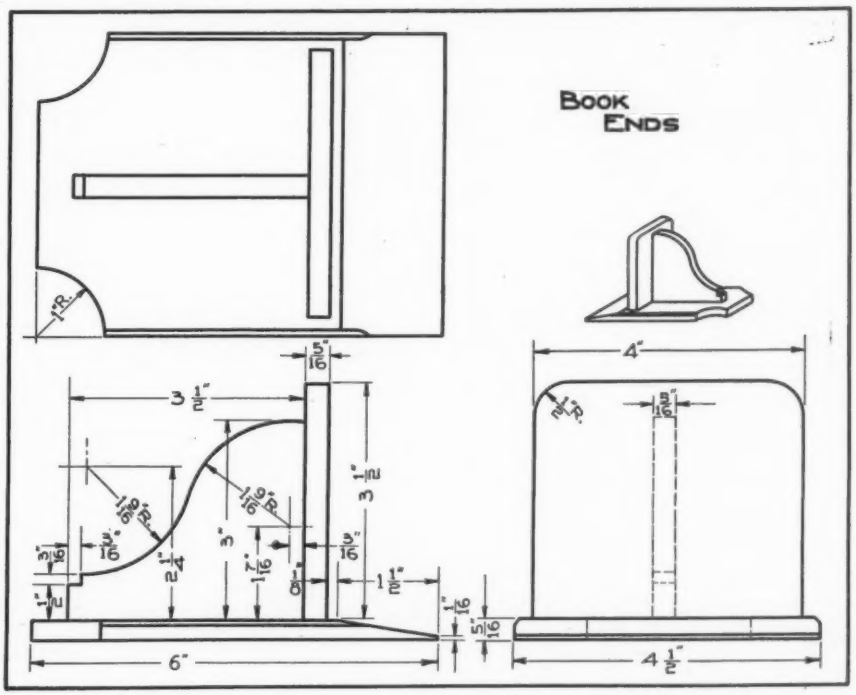
BOOK ENDS

A. M. Mercker, High School,
Quincy, Illinois

The book ends shown herewith are easily made out of odds and ends.

Cut the stock to over-all size using basswood or poplar. But two sizes of pieces are required as one piece the size of the upright will make both braces. These braces are cut from this piece with but one scroll cut.

Assemble with brads and finish with lacquer to suit the individual taste of the pupils.



EQUIPMENT RACK FOR DRAFTING TABLE

William W. Little, High School, Hastings, Nebraska

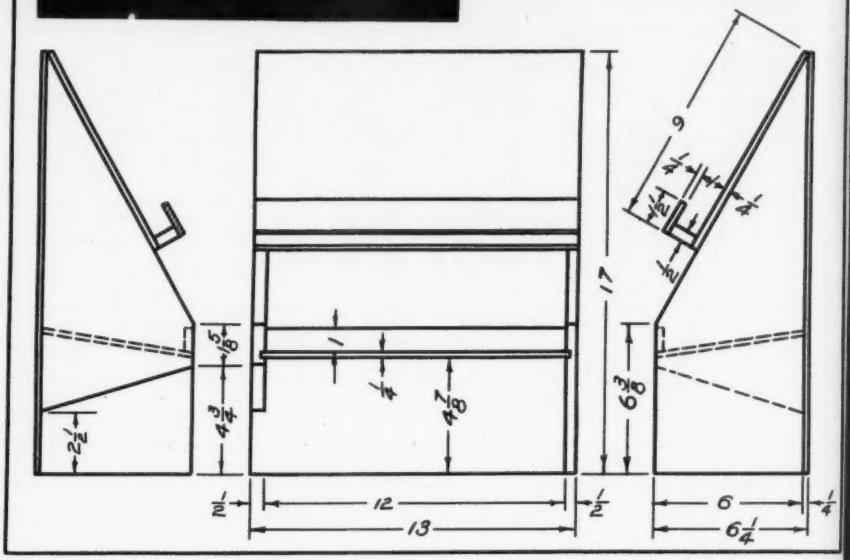
Teachers of mechanical and architectural drawing are ever faced with the problem of efficient arrangement of necessary equipment on the drawing table. The rack described in this article is easily made, and it saves books and instruments, and also helps eliminate the hazard of spilled ink and broken pencils.

The inclined bookrack holds blueprint, textbook, or layout sketch in such a position that it is ready to the eye, yet out of the way of drafting tools.

The slightly tilted shelf holds the instrument case, irregular curves, triangle, and ink bottle. This arrangement has been extremely successful in keeping instruments off the floor, the ink from spilling or spattering on tracings, or from falling off the desk.

The rack is so arranged that it will not interfere with the movement of the board or T square. The shelf allows free use of the entire desk top.

BILL OF MATERIALS		
REQ.	MATERIAL	SIZE
1	FIR PANEL	$\frac{1}{4}$ × 9 × 13
1	" "	$\frac{1}{4}$ × 6$\frac{1}{8}$ × 12$\frac{3}{8}$
1	" "	$\frac{1}{4}$ × 1$\frac{1}{2}$ × 13
1	" "	$\frac{1}{4}$ × 13 × 17
1	WHITE PINE	$\frac{1}{2}$ × 1 × 12
1	" "	$\frac{1}{2}$ × 1 × 13
1	" "	$\frac{1}{2}$ × 6 × 21



Equipment rack for drafting table

SHOP DUSTPAN

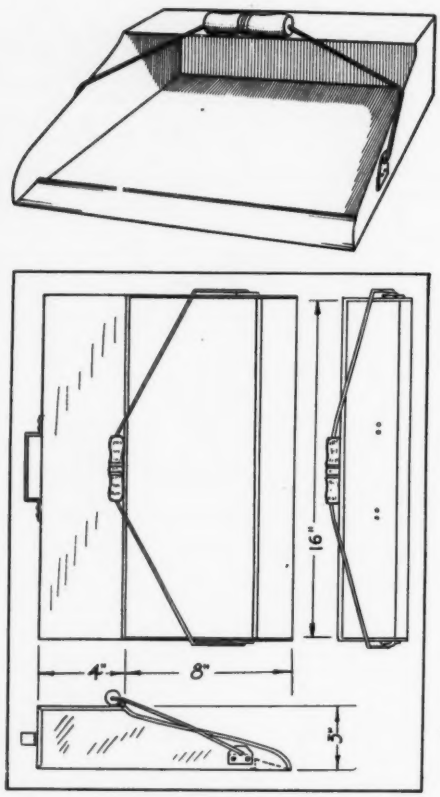
H. C. Rose, West Allis, Wisconsin

The dustpan illustrated herewith is designed to hold a large amount of waste and to allow the use of a 16-in. floor brush for brushing the shavings and dirt into the pan.

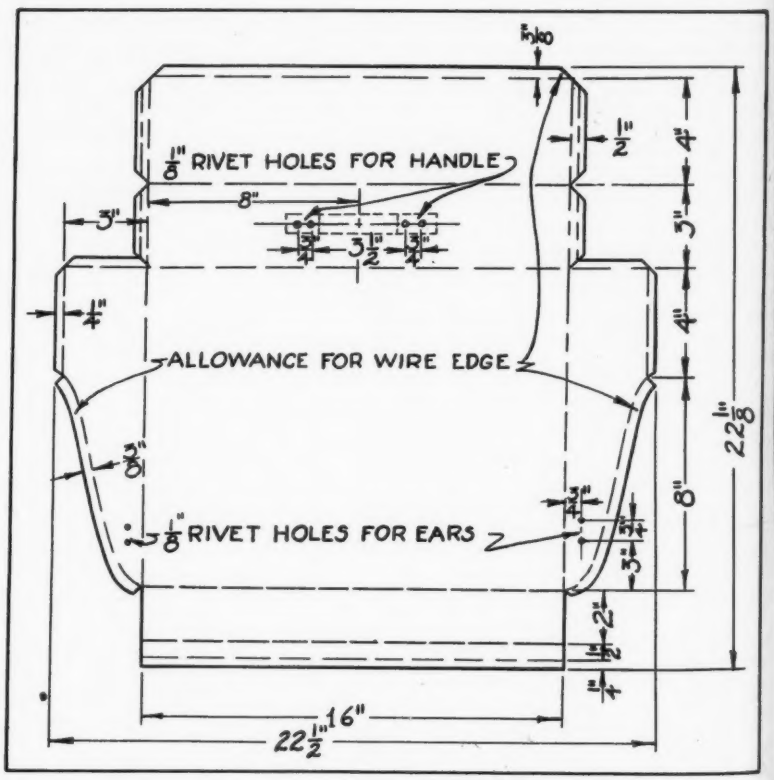
The design of the front edge keeps it straight and rigid, and prevents waste from sliding back onto the floor when the pan is held at an angle.

Galvanized iron of 28 gauge is satisfactory for the construction, and allows the pan to be made for about 20 cents.

(Continued on page 12A)



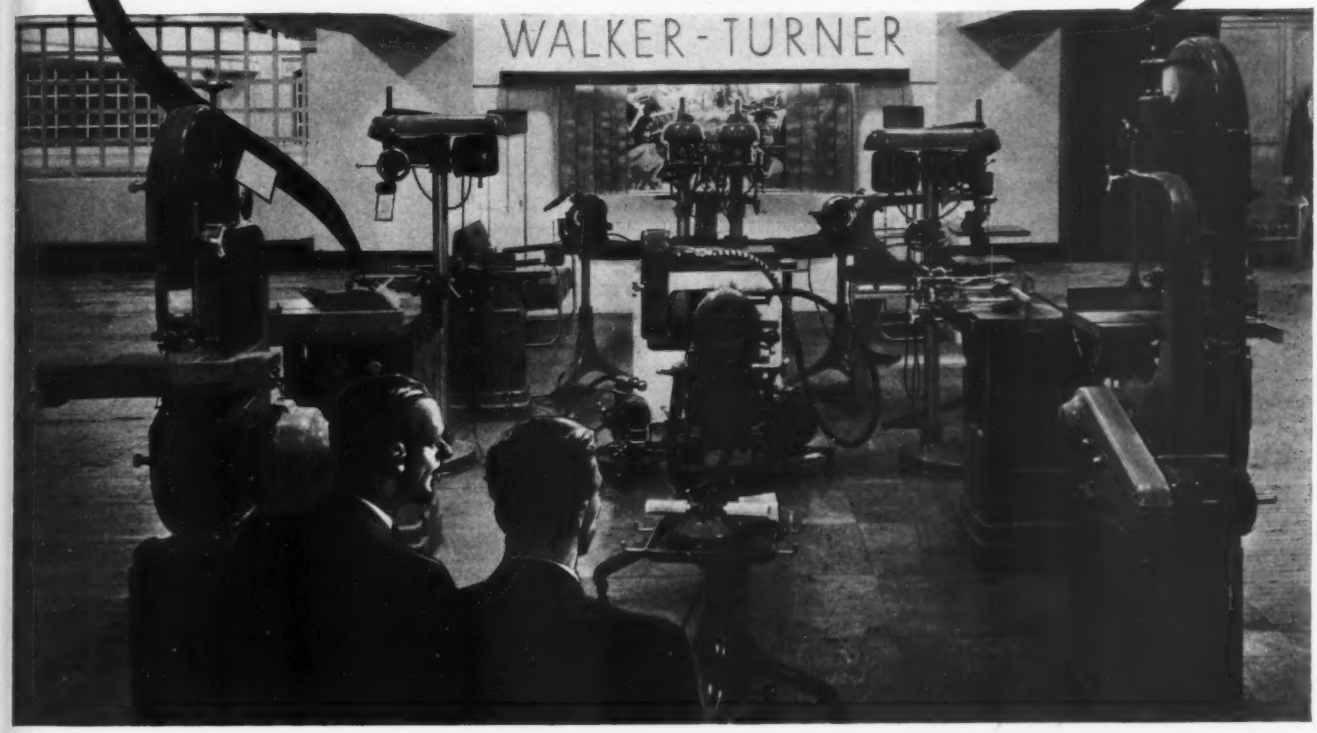
A shop dustpan



Layout for shop dustpan

1/4
228

NOW...I'LL AGREE --We CAN reduce our shop budget



NEW CLASS OF LIGHT MACHINES BUILT BY WALKER-TURNER ARE A PRACTICAL SOLUTION TO THE SCHOOL PROBLEM

Before you buy school shop equipment, it will pay you to look over the woodworking and metal working machines that caught industrial men's interest during the recent New York Power Show. You'll see a new class of equipment . . . *light machines* designed by Walker-Turner for Industry's new policy of running light work on light machines.

"Just Right for School Service"

That's what scores of school men say. Rugged, efficient, up-to-the-minute in design, these new machines cannot be confused with homecraft tools. They are made for production lines . . . prepared for years of hard work. Safety provisions are excellent.

A New Opportunity to Stretch Budgets

Priced much lower than heavy production equipment, these machines offer a practical solution to school budget problems. They make it possible to equip a shop for less. Or, get more equipment to train more pupils. Let us send the facts and names of local dealers. Mail coupon for Catalog that gives details on the new machines, and also Walker-Turner Light Power Tools in various price classes.

WALKER-TURNER
Light Machines for Industry

Drill Presses, Bench Saws, Band Saws, Jig Saws, Flexible Shafts, Jointers, Shapers, Bench Grinders, Lathes, Surfacers.

Walker-Turner Co., Inc.,
1949 Berckman St., Plainfield, N. J.

I am interested in your new class of machines for ☐ Woodworking ☐ Metal Working. Send a Catalog and names of dealers.

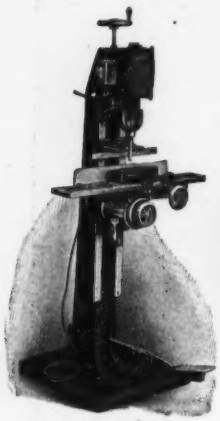
Name, Title .....

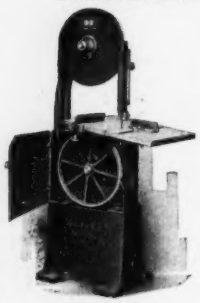
School .....

Address .....

Motor Driven Tilting Arbor Saw Bench

Junior Model Oilstone Tool Grinder


No. 194 Hollow Chisel Mortiser


18-inch Band Saw

OLIVER

JUNIOR LINE
WOODWORKING MACHINERY

The Junior Machines have all the refinements, adjustments, guards, etc., that were developed for the larger "Oliver" Machines.

To meet the needs of Industrial Arts and Vocational work as well as of industry, "Oliver" engineers developed the Junior Line of machines that have won acceptance by the merit of their dependability, service, durability, and safety.

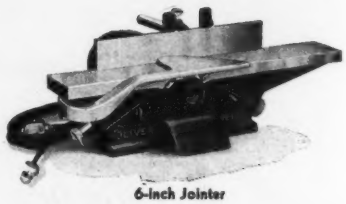
The acceptance of the "Oliver" line by schoolmen is based upon satisfactory results from "Oliver" equipment in use in school shops throughout the country.

THE "OLIVER" JUNIOR LINE

Saw Bench — Boring Machine — Band Saw — Tool Grinder — Manual Training Benches — Sanders — Clamps — Wood Trimmers — Motor Head Grinder — Electric Glue Heaters — Jointers — Mortiser — Oilstone Grinder — Vises (Woodworkers') — Electric Band Saw Brazer.

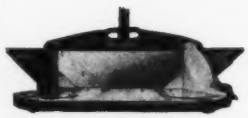
Ask for descriptive literature on these or any of our full factory size machines.

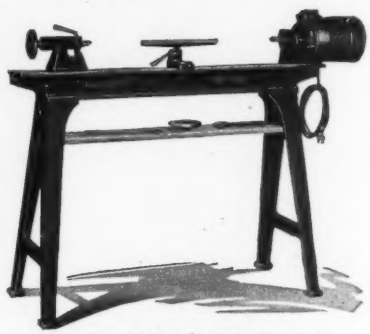
Oliver Machinery Co.
Grand Rapids Michigan


6-inch Jointer

Vise

Electric Glue Pot


Wood Trimmer


Junior Speed Lathe. 8-inch size illustrated also built in 12-inch size

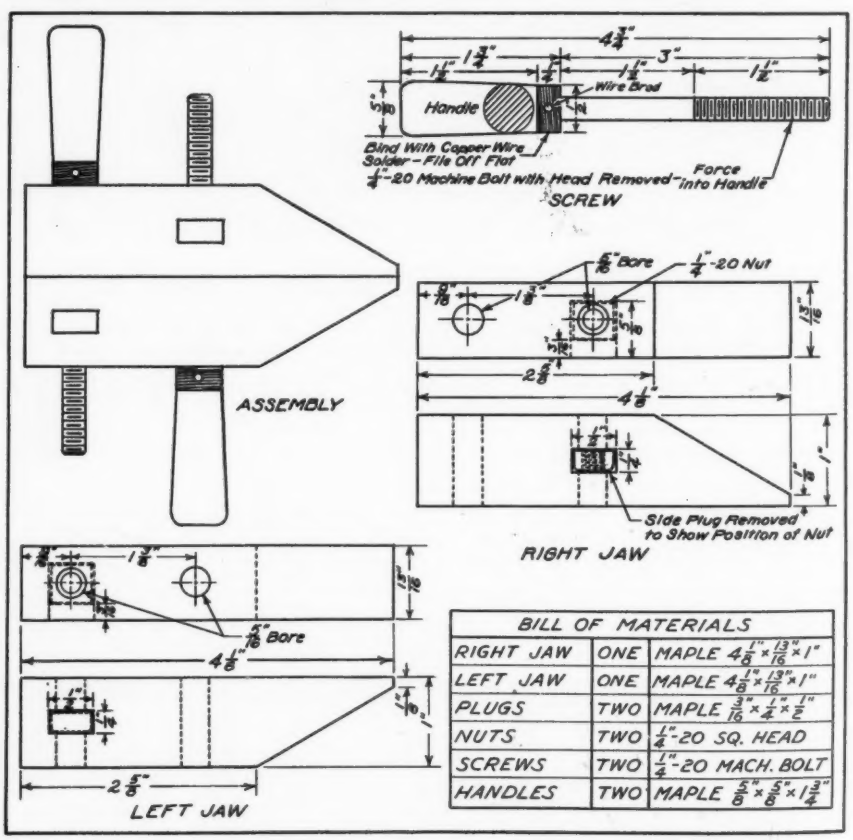
(Continued from page 176)

No sheet-metal operations are used in the construction that are not common to the metal shop. The pan shown was made by a ninth-grade student 6 years ago. It is still giving satisfactory service in a shop where it is used several times a day.

MODEL-MAKER'S CLAMP

A. W. Dragoo, Illinois State Normal University, Normal, Illinois

The small model-maker's clamp shown here is easily made and will prove very useful in holding small parts of boat, ship, or airplane models while under construction. The size and shape of the clamp may be varied to suit individual needs. In this clamp, common machine screws were used with the nuts recessed into the jaws as shown. If equipment for cutting a left-hand thread is at hand, the bolts can be made with one right hand and the other left hand. This might make the clamp somewhat easier to adjust, but the advantage is only slight.



BILL OF MATERIALS		
RIGHT JAW	ONE	MAPLE $4\frac{1}{8}" \times \frac{13}{16}" \times 1"$
LEFT JAW	ONE	MAPLE $4\frac{1}{8}" \times \frac{13}{16}" \times 1"$
PLUGS	TWO	MAPLE $\frac{3}{16}" \times \frac{1}{4}" \times \frac{1}{2}"$
NUTS	TWO	$\frac{1}{4}"$-20 SQ. HEAD
SCREWS	TWO	$\frac{1}{4}"$-20 MACH. BOLT
HANDLES	TWO	MAPLE $\frac{5}{8}" \times \frac{5}{8}" \times 1\frac{3}{4}"$

Model maker's clamp

Answers to Questions

USING SODIUM DICHROMATE IN STAINS

Q.: When sodium dichromate is used on mahogany, should it be left to dry and then finished, or does it have to be washed with a neutralizing wash, it being acid? — *W. M. M.*

A.: In using sodium dichromate, there is no necessity whatsoever for neutralizing this material, since the fact that it is an acid

STANLEY "BAILEY"
No. 5¼ Junior Jack

STANLEY "BAILEY" STANDS FOR CONSTANT IMPROVEMENT SINCE 1870 . . . . . .

HERE ARE A FEW MORE RECENT ONES:

Larger adjusting nut for easy adjustment

Embossed ring for the knob

Pear-shaped hole in lever cap that overcomes backward movement and loosening of cap.

DEVELOPED ESPECIALLY FOR SCHOOL SHOPS

Stanley "Bailey" No. 5¼ Junior Jack is 11½" long with a cutter 1¾" wide. Thus we have a well proportioned small size Jack Plane that is the ideal size and weight for the boys in your Junior High School shops. The Junior Jack has the same balanced "feel" that has made the Stanley "Bailey" Plane the favorite of craftsmen — since 1870 when Stanley "Bailey" marketed the *first* iron plane.

Write for Catalog 34-A, describing the full line of Stanley Tools.

STANLEY
TRADE MARK

STANLEY TOOLS
Division of The Stanley Works
EDUCATIONAL DEPARTMENT, NEW BRITAIN, CONN.

mordant, or color-setting material, makes it of value in a stain formula. Without such a component, many stains will and do fade. The neutralizing agent which you used accomplished exactly nothing and simply constituted an unnecessary operation. Apply your stains as directed in *Principles of Mill and Paint Shop Practice*, dry over night under average shop conditions, and then continue to produce the desired finish as specified. — *Ralph G. Waring.*

CRACKLE FINISH

1032. Q.: I have been trying to produce a crackle finish by using ordinary white inside paint as a base and a black automobile lacquer as the top coat, using the lacquer in a paint gun with very little success. Can you tell me where we are making a mistake? We are allowing the base to dry 48 hours. — *H. G. B.*

A.: The mistake you are making is in trying to use homemade mixtures to do the work. Spend less time and money by buying from a reputable manufacturer who can give you a guaranteed product. Why get a crackle finish, anyhow, when the whole idea has been dead for at least five years. Things grow old enough without making matters worse. — *Ralph G. Waring.*

SHELLAC MIXING LACQUER

1030. Q.: "Shellac mixing lacquer" is a term you often use in *Principles of Mill and Paint Shop Practice*. I am at a loss to know where one may purchase this material. Is ordinary lacquer different from mixing lacquer? — *L. A. M.*

A.: Shellac mixing lacquer is a particular grade and type known to manufacturers as ½-second cotton, alcohol soluble type. It can be secured from Pratt and Lambert Co., Tonowanda St., Buffalo, N. Y., or Murphy Varnish Co., Newark, N. J. Ordinary brushing lacquer can be substituted if used up entirely at the time of mixing; it will not be left in solution overnight, for instance, and will probably resist returning into solution even if mixed with high-grade lacquer thinner. Even if it could be brought back with lacquer thinner, the resulting solution would be too thin for use. — *Ralph G. Waring.*

Personal News

♦ Dr. Harry S. Ganders Dean of the School of Education, Syracuse University, announces a Curriculum Workshop in Secondary Education as a new feature of the Syracuse University Summer Session. Syracuse University is one of the ten institutions in the United States selected to receive the co-operation of the Committee on Workshops and Field Service of the Progressive Education Association during the 1939 Summer Session.

♦ JOHN W. STUDEBAKER, U. S. Commissioner of Education, ALEXANDER J. STODDARD, Superintendent of Schools, Philadelphia, Pa., and Chairman of the Educational Policies Commission, and CARL MILAM, Secretary of the American Library Association, constitute the new Advisory Board of the *Occupational Index*, which is prepared and distributed monthly by the National Occupational Conference, New York.

♦ EMERSON W. MANZER, Bronxville, N. Y., will teach art metal work at the summer school in Penland, N. C.

♦ Lex Claybourn, President of the Claybourn Division, C. B. Cottrell Company, spoke at the Tenth Lecture Series of the Department of Publishing and Printing of the Rochester Athenaeum and Mechanics Institute, Rochester, N. Y., on "Modern Methods of Letterpress Printing and Precision Standards," February 21, 1939.

New Publications

♦ The American Automobile Association has recently made available a very helpful book entitled *Sportsmanlike Driving*. It is an outgrowth of a series of bulletins bearing the same title, that were issued by the Association.

In its present form, the book represents the integrated efforts of many specialists, each of whom is an authority in his or her areas of contribution, working under the general direction of Burton W. Marsh, Director, Safety and Traffic Engineering Department, A.A.A.

The five major units of the book deal comprehensively with the following topics: The Driver, Driver and Pedestrian Responsibilities, Sound Driving Practices, Society's Responsibilities, and How to Drive.

The book is interesting, readable, and practically helpful. Prospective drivers will find the book rich in valuable suggestions; experienced drivers will want to read the book to see what others have to recommend on "sportsmanlike driving." A total of 261 well-selected illustrations help to bring out important facts and right practices.

Well-known educators, psychologists, research workers, scientists, experts in automobile construction, and superior drivers represent only a part of those who have contributed to this book.

Sportsmanlike Driving will be of special interest to all who wish to co-operate toward greater highway safety and more enjoyable motoring. — *F. Theodore Struck.*

(Continued on page 14A)

Here's a fascinating craft to introduce into your school shop

POTTERY MADE EASY

By John W. Dougherty

The first complete analysis of the pottery craft on the beginner's level, it gives simple, easy-to-follow instructions for turning out artistic pieces together with complete directions for making the necessary equipment. Detailed descriptions and helpful illustrations cover the various methods: coil, sticking up with slabs, modeling, casting, pressing in molds, and throwing on a wheel.

Every step in the work is covered from the mixing and wedging of the clay to the forming, decorating, finishing, firing, and glazing of the object. $2.25

THE BRUCE PUBLISHING COMPANY
206 MONTGOMERY BUILDING MILWAUKEE, WIS.

(Continued from page 13A)

Display Composition — Unit II, I. T. U. Lessons in Printing

By John H. Chambers. Cloth, 316 pages, 6 by 9, illustrated. Price, cloth, $2.60; paper, $2. Published by the Bureau of Education, International Typographical Union, Indianapolis, Ind.

This is Unit II of the excellent series of instructional books which the International Typographical Union makes available to the apprentices and learners of printing.

These texts are also made available to duly accredited public schools for class instruction.

The subjects covered in Unit II are divided into the following ten sections: How to make simple layouts, various styles of display, elementary principles of display, how to set simple display, how to set display ads, how to design and set modernistic display, how to write and set effective newspaper and magazine heads, how to use borders, how to use initials, and how to set tabular matter.

How to Succeed in Retail Selling

By Ray Morton Hardy. Cloth, 190 pages, 5⅝ by 8 1/17. Price, $2. Published by Harper and Brothers, New York City.

Laboratory Experiments in Elementary Physics

By Newton Henry Black. Cloth, 264 pages, 5½ by 8¼, illustrated. Price, $1.24. Published by The Macmillan Company, New York City.

Principles and Practice of Show-Card Writing

By Lawrence E. Blair. Cloth, 241 pages, 6¼ by 9¼, illustrated. Price, $2.50. Published by the McGraw-Hill Book Company, Inc., New York City.

A well-organized course covering the principles of show-card writing. The book presents the fundamentals not only of the standard show-card styles of lettering, but also of the principles of layout, arrangement, color theory and practice, and of advertising methods.

The book shows many examples of the work of practical show-card writers, thus helping the beginner to get a good grasp of what is expected by the customers who make use of this type of advertising.

News Notes

♦ A deplorable disaster has brought grief and almost irreparable loss into the life of 75-year-old Frederic W. Goudy, famous type designer. On January 26, early in the morning, fire demolished the 150-year-old water mill at Marlboro, N. Y. which Goudy had converted into a workshop sixteen years ago. In this fire were lost many of the type designs and matrices of the 107 type faces designed by him. The loss is only partially covered by insurance.

♦ The department of industrial and vocational education at the Kansas State Teachers College, Pittsburg, Kans., recently completed the installation of $25,000 worth of new equipment, made possible by a special appropriation of the State Legislature of 1937. The allocation of this sum to the various shops and drafting rooms was approximately as follows: Metalwork, two shops, $7,000; printing, three shops, $7,000; advanced cabinetmaking, $4,000; elementary cabinetmaking, $3,250; auto mechanics, $1,400; general shop, new, $1,250; benchwork in wood, $800; drafting rooms, two, $300; total, $25,000.

♦ The Board of Education at Owensboro, Ky., is planning to construct a new vocational high school for the Owensboro system. At the present they have a small Trade High School for boys in which are taught auto mechanics, electricity, carpentry, machine shop, and printing. The plan is to introduce commercial and other vocational courses for girls, and to extend the trade for boys to include electric welding, aviation, show-card writing, and the like. The building will be constructed with the aid of the WPA.

♦ Carnegie Institute of Technology, Pittsburgh, Pa., will henceforth discontinue summer sessions in industrial education.

♦ The Kansas Vocational School, Topeka, Kans., has purchased over $1,000 worth of equipment for its auto-mechanics shop. Charles E. Lee is the instructor.

♦ "Education has not kept pace with the rapid developments and progress in the field of aviation" John W. Studebaker, Commissioner of Education states in a report to Secretary of Interior Ickes. Only 130 high schools and 109 colleges and universities report aviation courses, in which 43,000 students are enrolled.

Questionnaires and letters received from more than 12,000 high schools and colleges in the Office of Education survey, conducted under the direction of Robert W. Hambrook, Trade and Industrial Education Agent, reveal that 25,000 boys and girls are members of aviation clubs in high schools, but that only 7,000 are actually studying it in technical and vocational courses.

♦ High-school seniors in Detroit, Mich., will benefit from a counseling setup, arranged through the co-operation of the guidance division and the Wayne County Medical Society. Counseling service is given by eight physicians of the society to seniors who are preparing to enter the medical profession.

♦ Students in the lubrication and welding unit of the Industrial Laboratory, Dearborn, Mich., under the direction of Leslie Wagner, of the Fordson Industrial Faculty, have completed five steel tool cribs for the junior-high-school shops. The cribs are constructed of Steel-o-mesh and range from 13 to 20 ft. in length, with double-hinged tool doors, 13 by 60 ft.

♦ Under the sponsorship of L. G. Wines, the Fordson Aero Club, a chapter of the Future Farmers of America, at Dearborn, is conducting a guidance program for its members. At the first of the series of lectures, Mr. F. H. Pearson, of the Detroit City Airport, spoke on "Aspects of Meterology as a Vocationist."

♦ The mounting importance of metallurgical research was emphasized at the University of Notre Dame with the establishment of a new research fellowship by John J. O'Brien, President of the South Bend Lathe Works. Mr. O'Brien's many

ARE your boys merely learning a "hobby" or laying the foundation for their life's occupation?

Starrett Catalog 26 CE illustrates and describes a complete line of Starrett Tools and Hacksaws for school and shop classes.

For more than half a century, skilled craftsmen have done their best work with Starrett Tools.

Starrett Educational Sets show how to use the essential precision tools. Fourteen 8 x 10½ blue-printed pages punched to fit a standard notebook. Furnished at cost, 10 cents per set.

THE L. S. STARRETT CO., ATHOL. MASS., U. S. A.

World's Greatest Toolmakers — Manufacturers of Hacksaws Unexcelled — Steel Tapes, Standard for Accuracy — Dial Indicators for Every Requirement

Standardize on STARRETT TOOLS

years of keen interest in the promotion of increased research in engineering fields were shared by his brother, Miles, during the latter's lifetime.

In announcing the new foundation, Rev. J. Hugh O'Donnell, C.S.C., university vice-president, said that Mr. O'Brien's gift is in the form of a joint benefaction which will be designated as "The Miles and John J. O'Brien Fellowship in Metallurgy and Allied Sciences." It will provide funds for the pursuit of postgraduate study and research by men who intend to devote themselves to a life of teaching. Scholarship recipients, to be named annually, will be selected on the basis of proved ability, character, and financial need.

♦ Office of Education Bulletin 1937, No. 34, *Industrial Arts: Its Interpretation in American Schools,* which was out of print, will go back to press by the Government Printing Office. Copies of it will, therefore, be available by purchase from the U. S. Department of the Interior, Office of Education, Washington, D. C.

Association News

♦ The conferences on industrial-arts teacher education held in Cleveland during the meetings of the American Association of School Administrators, February 27–28, concluded with a constitutional convention at which industrial-arts representatives from 20 states prepared and adopted a constitution for the creation of the American Industrial Arts Association.

The following officers were elected: President, Dr. William E. Warner, Ohio State University, Columbus, Ohio; vice-president for elementary-school programs, Dr. Heber A. Sotzin, State College, San Jose Calif.; vice-president for secondary-school programs Lester C. Smith, University of Chicago High School; vice-president for higher and teacher-education programs, Dr. Ralph W. Swetman, Principal, State Normal School, Oswego, N. Y.; vice-president for adult and out-of-school programs, Professor Burl N. Osburn, State Teachers College, Millersville, Pa.; secretary, Professor William H. Coppedge, Alabama Polytechnic Institute Auburn, Ala.; treasurer, Professor John J. Hatch, State Teachers College, Newark, N. J.

♦ February 25 marked the tenth anniversary of the founding of Epsilon Pi Tau at the Ohio State University. Industrial-arts leaders from many states gathered to commemorate the occasion. The morning was devoted to an inspection of two of the Ohio model programs of industrial arts located in the high schools at Gahanna and Grove City. This was followed by a luncheon program at the Ohio State University Faculty Club where Dr. William E. Warner presided. The entire group then came to the Olentangy Village to visit the new National Headquarters of Epsilon Pi Tau at 2893 Neil Avenue.

Following a formal initiation held in the Tau Kappa Epsilon House late in the afternoon, the meetings were climaxed by a banquet at which Dr. Lawrence F. Ashley, Chief of the Division of Vocational Education at Yonkers, N. Y., presided.

At the initiation ceremonies, Dr. Thomas E. French, Chairman of the Department of Engineering Drawing at the Ohio State University was made an honorary member. Professor John A. Whitesel of New Britain, Conn., served as master of ceremonies and was assisted by Dr. Ashley of Yonkers, N. Y.; Professor C. Blair MacLean of Fitchburg, Mass.; Professor Victor L. Bowers of Commerce, Tex.; Professor Hartwig O. Bjerg of Flagstaff, Ariz.; Professor John J. Hatch of Newark, N. J.; Professor DeWitt Hunt of Stillwater, Okla.; Professor Kenneth W. Brown of Muncie, Ind.; Professor Harold G. Palmer of Cedar Falls, Iowa; and Dr. Warner of the Ohio State University.

Among the initiates were Professor William H. Coppedge of Alabama Polytechnic Institute at Auburn, Professor Secundino Vega of the University of Puerto Rico, and Mr. John N. Willmott, Director of Industrial Arts at Garden City, Long Island.

The following students and alumni of Ohio State University were initiated on behalf of Alpha Chapter: Philip R. Anderson of Chillicothe, Dale J. Baughman of Columbus, Gabriel Beekman of Hillsboro, Leonard H. Dinan of Costalia, Kenneth L. Field of Cleveland, LeGrand H. Headington of Columbus, Paul A. Lerner of Cambridge, Paul E. Morley of Columbus, Walter B. Oliver of McKeesport, Pa., Carroll A. Osborn of Leonardsburg, Perry G. Rawland of Iowa City, Iowa, and Chester E. Riley of Louisville.

Then there were seven initiates who came from the Ball State Teachers College at Muncie, Ind. These are: Merle D. Hartzler of Goshen, Ind.; Loren S. Jones of Lucerne, Ind.; W. Max Jones of Lucerne, Ind.; Paul L. Justice of Anderson, Ind.; C. Shirley Kinder of Sheridan, Ind.; Thorval L. Mattax of Blufton, Ind.; and Luther Waddy of Marion City, Ind.

From Iowa State Teachers College at Cedar Falls there were five. Their names are: John A. Healy of Mount Auburn, Iowa; Duncan L. Lampman of Charles City, Iowa; Galer J. Miller of Hampton, Iowa; Gerald B. Moser of Sumner, Iowa; and Lloyd R. Wilson of Mason City, Iowa.

Among the many other members of the Fraternity to come to Columbus for the celebration were: George J. Bilsey of Cleveland; Lloyd B. Bjornstad of Athens; Harry Bock of Glen Head, N. Y.; J. Knapp Boddiford of Sylvania, Ga.; Elmer W. Christy of Cincinnati; Richard R. Crow of Greenhills; Charles A. Eckert of Newark; Paul Hiser of Grove City; Charles R. Kinison of Athens; James S. Kirkpatrick of Newark; John R. Ludington of Muncie, Ind.; Dale E. Mansperger of Euclid; Anthony Marinaccio of Hartford, Conn.; Paul Miller of Buffalo, N. Y.; U. Lowell Monical of Euclid; Allen A. Nelis of Athens; Arthur R. Oliver of Byesville; Theodore Paige of Athens; Clarence W. Reese of Walhonding; John Robertson of California,

(Continued on page 17A)

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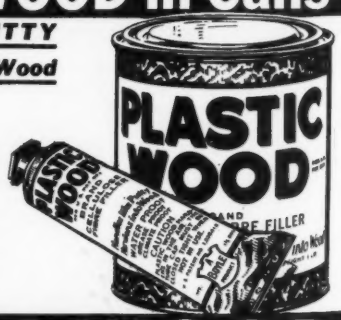

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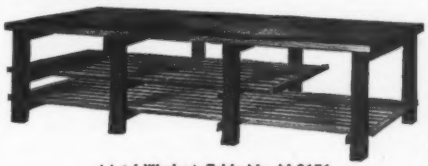

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(Continued from page 15A)

Pa.; William T. Shaneyfelt of Albuquerque, N. Mex.; Lawrence C. Secrest of Napoleon; James Snyder of Canal Winchester; and Willis A. Whitehead of Newark.

Epsilon Pi Tau now numbers 1,500 members located in 42 states and in India.

♦ The Metropolitan Industrial Arts Round Table of Chicago and Suburban Area, held a meeting at Maine Township High School, Des Plaines, Ill., at 6:30 p.m., February 17, 1939.

H. P. Harshbarger, Director, Department of Practical Arts, Maine Township High School, was the general chairman.

The toastmaster at the banquet was H. C. Taylor, Chairman, Metropolitan Industrial-Arts Round Table. After the dinner the large number of members who were in attendance repaired to an auditorium where a panel discussion on "Some Obstacles to be Overcome in Promoting an Adequate Program of Industrial Arts" was held.

The panel personnel follows: Dr. William E. Warner, Professor Industrial Education, Ohio State University, Columbus, Ohio; Dr. L. V. Newkirk, Director, Bureau of Handwork and Industrial Education, Public Schools, Chicago, Ill.; Dr. W. C. Reavis, Professor of Education, Superintendent of Laboratory Schools, University of Chicago, Chicago, Ill.; Dr. J. M. Hughes, Professor of Education, Northwestern University, Chicago, Ill.; John J. Metz, Editor, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, Milwaukee, Wis.; A. B. Mays, Professor of Industrial Education, University of Illinois, Urbana, Ill.; Karl L. Adams, President, Northern Illinois State Teachers College, DeKalb, Ill.

The discussion by members of the panel and from the floor was quite animated, and adjournment did not take place until almost 11 p.m.

♦ The third annual state convention of the Future Craftsmen of America will be held March 31 and April 1, 1939, at the Connelley Vocational High School, Pittsburgh, Pa.

The purpose of the organization is to promote the spirit of craftsmanship; to create interest in hobbies; in the study of occupations; in understanding trade ethics and safety; in forming habits of thrift; and in encouraging fellowship among the youths interested in industrial education.

The program will include a trip through the Connelley Vocational High School, a visit to a broadcasting station, and a sightseeing trip through the city.

There will be several general meetings, a business meeting, a ritual team presentation, a number of contests, and several banquets for the delegates who attend.

♦ Over 300 mechanical executives from New York State newspapers attended the Mechanical Research Conference held on February 6 and 7, in the Printing Laboratories of the Department of Publishing and Printing of the Rochester Athenaeum and Mechanics Institute. The event was sponsored by the New York State Publishers Association.

A new scheme of sharing experiences and deciding on various correct mechanical methods in production was inaugurated. Twenty-one clinics met on Monday morning, February 6, when round-table discussions were held on pertinent problems previously selected by the members themselves through a survey and questionnaire. The results of each clinic were then reported in a general session in the afternoon and discussion from the entire group was invited.

On Tuesday, February 7, demonstrations were held in the laboratories of the department, where experts from the various equipment manufacturers explained the operations of many machines, how difficulties could be avoided, and production increased.

The composing-room clinics included groups which discussed the following problems or machines: General production, Linotype and Intertype, Ludlow and Elrod, Make-up, Monotype Giant Caster, material maker, and metal. The Pressroom clinics discussed general production, ink, press packing, and rollers. The stereotype executives held meetings on general problems, mats and molding, and metal problems. An engraving room and publication desk clinic also was held.

Five newspaper photography clinics were held in the Photo-Tech Laboratories of the Institute on the following subjects: Requirements of photos for newspaper reproduction, the photoflash lamp in press photography, the future of color in newspaper photography, darkroom procedures and administration, and cameras for press photography.

Cochairmen of the conference were Byron G. Culver, counselor, and R. Randolph Karch, technical supervisor of the department of publishing and printing. Host was Dr. Mark Ellingson, president of the institute. Other faculty members served as vice-chairmen and included: Joseph F. Sorace, Frank DeWitt, C. Milnor Cook, Walter Powell, and Adam Gilliland, C. B. Neblette, supervisor of the photographic-technology department, was in charge of the photography clinics.

♦ The first official meeting of the Nebraska Industrial-Arts Teachers Association was held on May 4, 1935, at the Morrill Hall of the University of Nebraska. There had been several preliminary meetings held for the purpose of determining interest, and arranging the program.

Mr. A. C. Easton, professor of practical-arts education, took the initiative of calling for the organization meeting. Mr. C. A. Fulmer, State Director of Vocational Education; Mr. Sidney Owen, State Supervisor of Trade and Industrial Education; and Mr. A. C. Easton appeared on the program.

At the first business meeting, the following officers were elected: A. C. Easton, Lincoln, president; A. V. Larson, Peru, vice-president; L. H. Lindahl, Chadron, secretary-treasurer. R. A. Schreiner, Kearney; P. A. Tucker, Norfolk; and G. Y. Conley, Holdrege, were elected trustees.

The second meeting was held at the Hotel Cornhusker, Lincoln, on March 24–25, 1936.

(Continued on page 18A)

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(Continued from page 17A)

This was the first of a series of joint meetings with the department of superintendents and principals and the department of elementary-school principals. Mr. Will Irwin was the principal speaker.

At the industrial-arts section meeting there was an exchange of plans in blueprint form: F. J. Franzsen, Omaha, *Values of Auto Mechanics as an Industrial-Arts Subject;* R. R. McGee, Columbus, *Industrial Arts from the Standpoint of the City Superintendent;* C. R. Lindstrom, Peru, *The General Shop Program;* L. H. Alberty, Lincoln, *Industrial Arts and Vocational Education from the Viewpoint of the City Supervisor;* Sidney Owen, Lincoln, *Recent Developments in Vocational Education;* Floyd Chase, Cook, *Industrial Arts from the Standpoint of a Village Superintendent.*

During the business meeting the constitution and bylaws were revised and the organization resolved itself into committees to work on a new course of study for industrial arts for the state.

All of the old officers were re-elected and the following three trustees were added to the executive committee: Lawrence Salsow, Alliance; William Hepfinger, Blair; and A. H. Miller, Lincoln.

The third annual meeting was held in the Hotel Cornhusker, Lincoln, on March 19–20, 1937.

Dr. D. B. Stuit, of the University of Nebraska, gave an interesting discussion of aptitude testing.

After committee reports had been read, the various committees on the course of study met to compare notes and make plans for completing the work. The following were elected as officers for the year 1937–38: Dr. Walter A. Klehn, Kearney, president; L. H. Alberty, Lincoln, vice-president; W. W. Little, Hastings, secretary-treasurer; W. E. Clark, Columbus, replaced William Hepfinger, Blair, on the executive committee.

The fourth annual meeting was held on March 25–26, 1938, in the Hotel Lincoln at Lincoln, Nebr.

Dr. O. L. Clevenger, was the principal speaker on the program. During the afternoon meeting on Saturday, a forum on improvement of industrial-arts teaching was held. Several members participated.

Officers of the Nebraska Industrial-Arts Teachers Association. Left to right: W. E. Clark, Columbus, president; Carl J. Orness, Lincoln, vice-president; Otto C. Olson, Kearney, secretary-treasurer

W. E. Clark, Columbus, was elected president; Carl J. Orness, Lincoln, vice-president; and Otto C. Olson, secretary-treasurer. William Hepfinger, Blair; E. J. Huntemer, Wayne; and Grover Rost, Grand Island, were elected as trustees.

The next annual meeting will be held at Omaha, April 21 and 22, 1939.

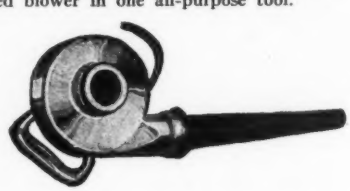
The association has also been invited to attend the three-day regional vocational conference to be held at Omaha by Dr. Edwin A. Lee.

♦ Grand Rapids is the location for the 1939 Western Arts Convention. The meeting occurs in May at the time when Michigan is particularly beautiful with fruit trees in bloom and when the Tulip Festival occurs in Holland. Michigan has many other points of interest beside the scenic delights which art lovers would not want to miss while en route to Grand Rapids — Cranbrook, Bloomfield Hills; Children's House and Art Institute, Detroit; "Student Union," Kalamazoo; quaint old architecture, Marshall; Cromaine Craft, Howell; modern houses, Midland; and the Kellogg Bird Sanctuary near Battle Creek.

Grand Rapids is looking forward to the convention as an opportunity to share with others its professional enthusiasms and problems. The Grand Rapids Art Teachers Club has arranged for a room at the Pantlind Hotel where art people may drop in and become acquainted. The entire local committee extend to all a cordial welcome.

New Products

SKILSAW, INC., Chicago, Ill., announce a new kind of portable electric blower, known as the Skilsaw "Airmaster," a 2-speed blower that combines the utility of both a high-speed and a low-speed blower in one all-purpose tool.



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(Continued on page 21A)

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(Continued from page 18A)

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THE GROBET FILE CORPORATION of America, 3 Park Place, New York City, which last year introduced its line of high-speed steel flat drills for the piercing of small holes, announces its new line of cylindrical plug gauges for the checking of such holes. The illustration shown herewith shows the actual size of one of these gauges.

These gauges are available in diameters from .100 to .084 in., varying by thousandths. They can also be obtained on special order, varying by ½ and ¼ thousandths, and in the metric system of measurements. Double-end gauges, to check tolerances, can also be made to order.

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THE SHELDON MACHINE CO., INC., Chicago, Ill., announce a new back-geared, screw-cutting precision lathe, designed especially for small shops, toolrooms, garages, and home craftsmen. This lathe has been named the Sheldon "Metal Worker." It has a 10⅛-in. swing, center distances of either 20 in. or 26 in. with bed lengths 38 or 44 in. respectively. Among the special quality features claimed for this lathe are: Hob-cut semisteel change gears, oversize hardened-steel spindle, ground all over with 1 1/16-in. hole through its entire length, and a heavy semisteel base with 2 hand-scraped V ways and 2 flat ways. A complete line of attachments, accessories, and drives for both bench and floor models are available.

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IN A SPECIAL ANNIVERSARY MESSAGE to industry and the trade this month, Paul C. Nicholson,

(Continued on page 23A)

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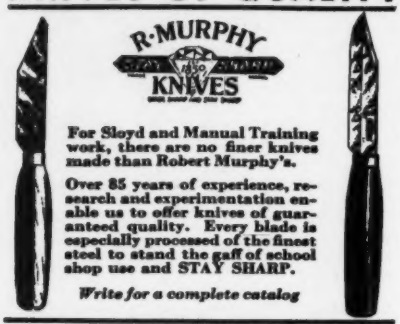

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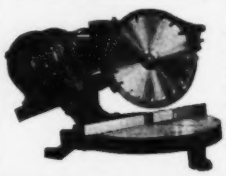

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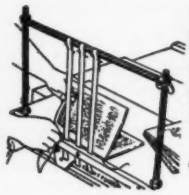

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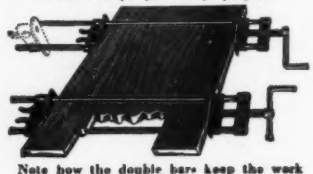

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THE DUMORE CO., Dept. 239-D, Racine, Wis.

(Continued from page 21A)

Vice-President of the Nicholson File Company, Providence, R. I., points out the significance of the 75th birthday of the famous firm of file manufacturers.

"In our commemoration of the Nicholson File Company's Seventy-Fifth Anniversary," Mr. Nicholson states, "we are, of course, observing the three quarters of a century which has passed

Paul C. Nicholson

since the founding of the company. But of still greater significance to industry is the observance of another event that took place concurrently with the company's founding; the introduction, by William T. Nicholson, of a successful method of cutting quality files by machine."

The founder's pioneering in quality production was sufficiently successful in the sixties and seventies, Mr. Nicholson states, so that only fourteen years after its founding, Nicholson File Company was supplying an annual volume double of all file imports.

In order to maintain the high standards set by William T. Nicholson in 1864, and at the same time to keep pace with the rapidly growing market that came with the machine age, the company expanded its activities to include four plants at Providence; Philadelphia; Anderson, Ind.; and Port Hope, Ontario; much of whose equipment was built by the company itself. The company today manufactures genuine Nicholson, Black Diamond, and McCaffrey Files and Rasps, and Nicholson X. F. Swiss Pattern Files, as well as the commercial brands including American, Arcade, Eagle, Great Western, Kearney & Foot, McClellan and J. Barton Smith.

THE H. CHANNON COMPANY, Chicago, Ill., has established a school technical service department to be devoted exclusively to assisting school-shop instructors and supervisors with their equipment and tool problems. Mr. F. B. Tannehill, graduate mechanical engineer, with long experience in this field, will be in direct charge of the department.

The H. Channon Company was founded in 1875 to serve industries which were then rapidly developing in the middle west. By holding strictly to its adopted high standards for its various lines of machinery, tools, and supplies, the company now counts thousands of industrial plants, schools, and colleges among its friends and has clients in all parts of the United States and in twenty other countries.

The entire resources, experience, and facilities of this organization are available as a courtesy to school-shop instructors and supervisors everywhere. Assistance will gladly be given on compiling equipment lists and suggestions for courses of study, planning shop layouts, etc.

A new illustrated shop-equipment handbook, on press now, will be mailed free, postpaid to school instructors and executives on request. Your copy of this practical handbook may be obtained by writing H. Channon Company, N. Wacker drive at Randolph Street, Chicago, Ill.

CRAFT SERVICE, 360 University Ave., Rochester, N. Y., have just issued the seventh edition of their catalog of craft materials for schools, scout troop, and homecrafters.

This catalog furnishes a full list of tools and supplies needed by those interested in leathercraft work, celluloid and plastics, craft metal, cellocraft, wood burning, cork craft, birch craft, beadwork, model airplanes, weaving, basketry, square knotting, wood carving, archery and Indian craft, sponges, and glass etching.

AN UNUSUAL CONTEST, exclusively for industrial-arts instructors, has just been announced by the Delta Manufacturing Company of Milwaukee, Wis., pioneers in the development of low-cost light power tools for schools and industry. Because of the widespread adoption of this new type equipment by schools and universities in recent years, there has been an increasing demand for information on shop arrangements and methods for using these tools to best advantage.

Liberal cash prizes and other inducements are being offered by the Delta organization in order to encourage the gathering of this information from those instructors who have had actual experience in using light power tools in their shops. For the best letter and shop layouts in the woodworking field, the cash awards will be $75, $50, $25, and five $10 prizes. An equal amount in prizes will be awarded for letters and shop layouts for general shops. Just as important as the cash awards is the fact that all entrants in the contest will receive a book containing the 50 best letters and layouts.

The board of judges will include four industrial-arts instructors. The contest will close May 15, 1939, and the winners will be announced on June 1. Full details and entry blanks can be obtained from the Industrial-Arts Contest Division, Delta Manufacturing Company, 600–634 E. Vienna Ave., Milwaukee, Wis.

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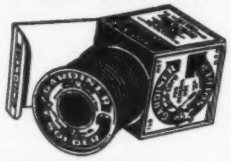

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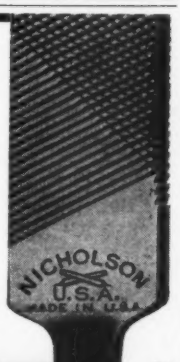

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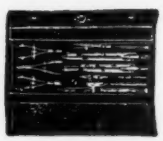

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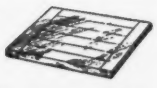

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